

**TU77 Magnetic Tape Transport
Technical Manual
Volume I**

digital equipment corporation • maynard, massachusetts

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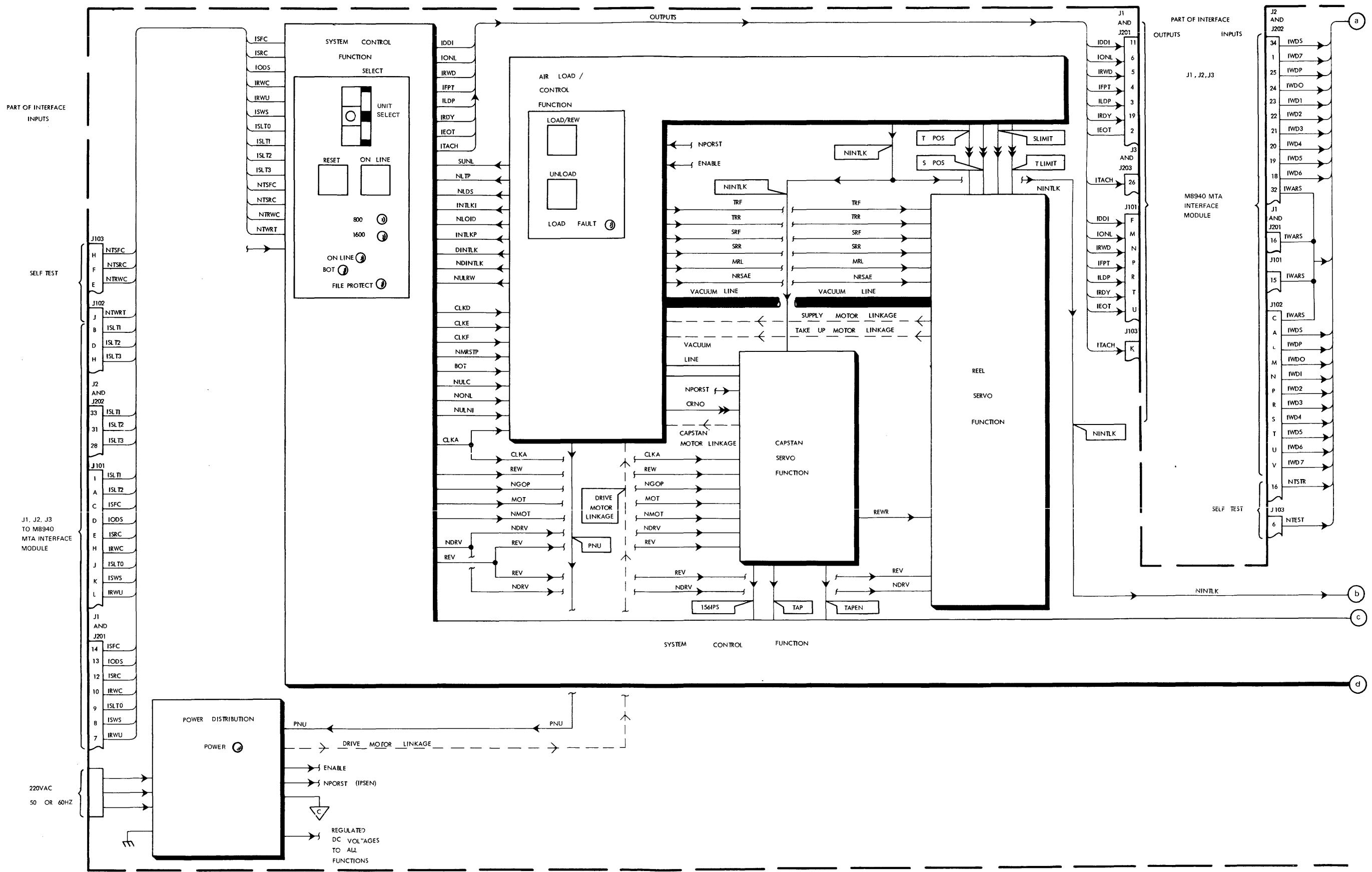


Figure 1 System Functional Block Diagram (Sheet 1 of 2)

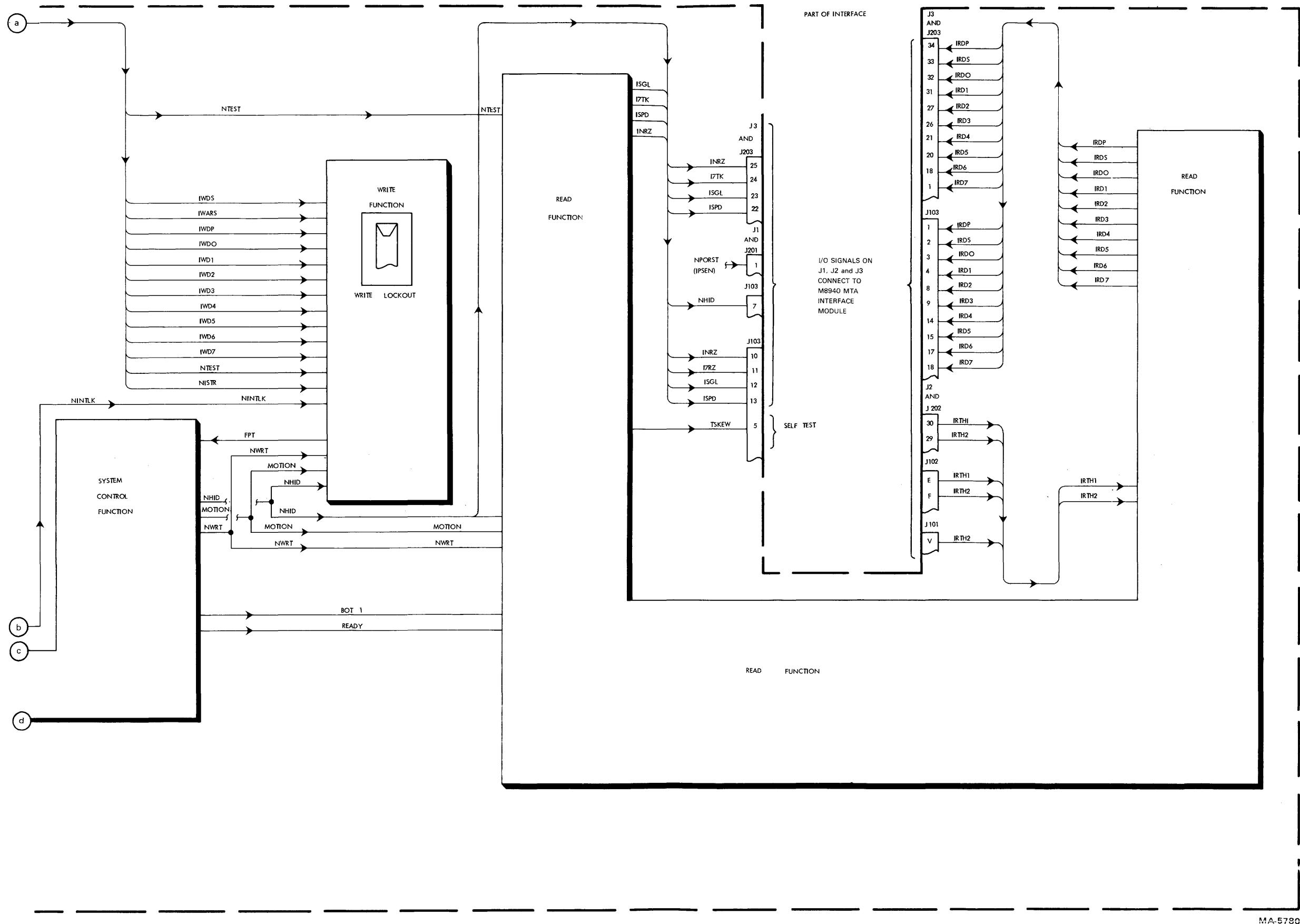


Figure 1 System Functional Block Diagram (Sheet 2 of 2)

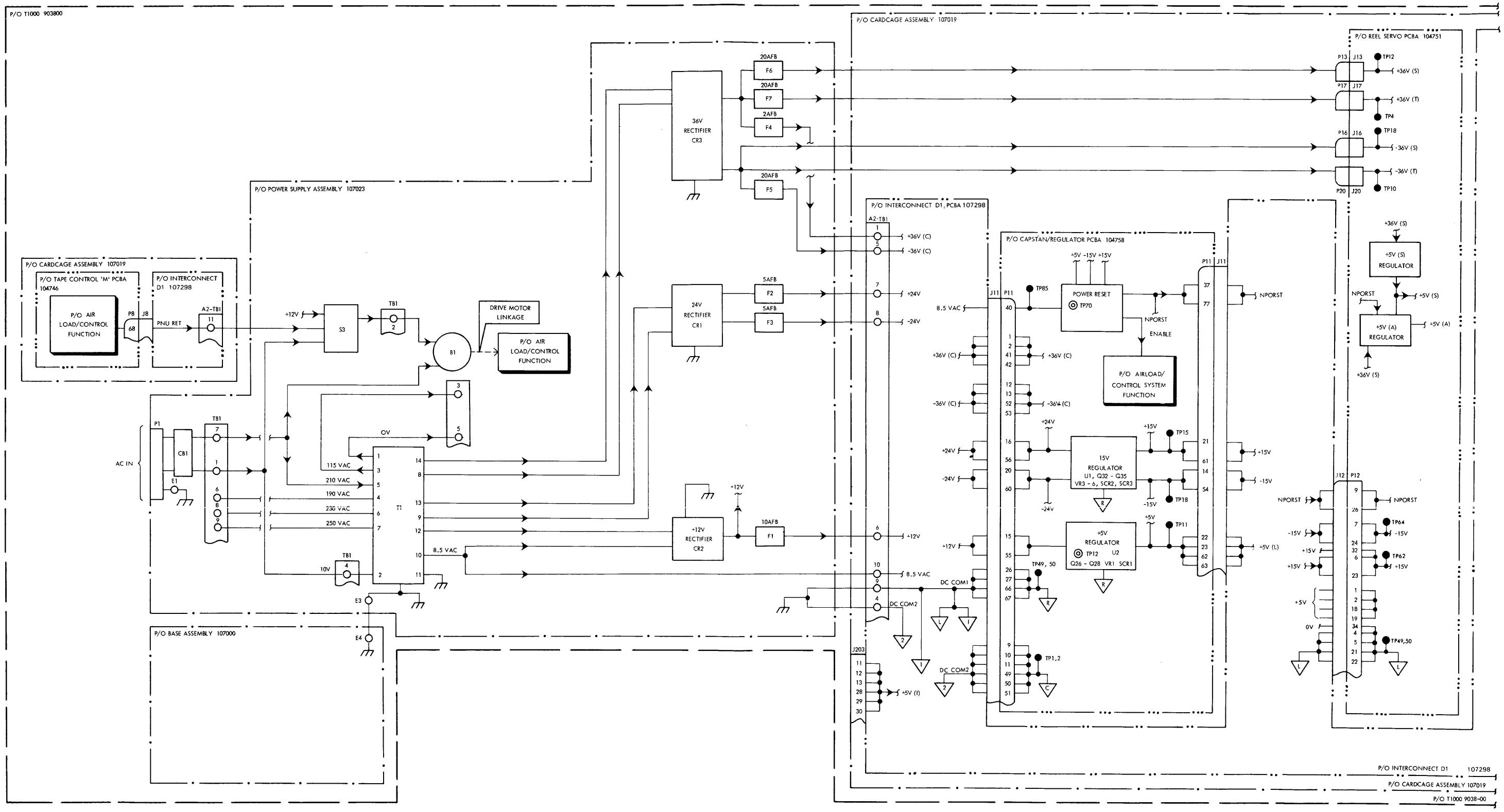


Figure 2 Power Supply and Distribution Functional Block Diagram (Sheet 1 of 2)

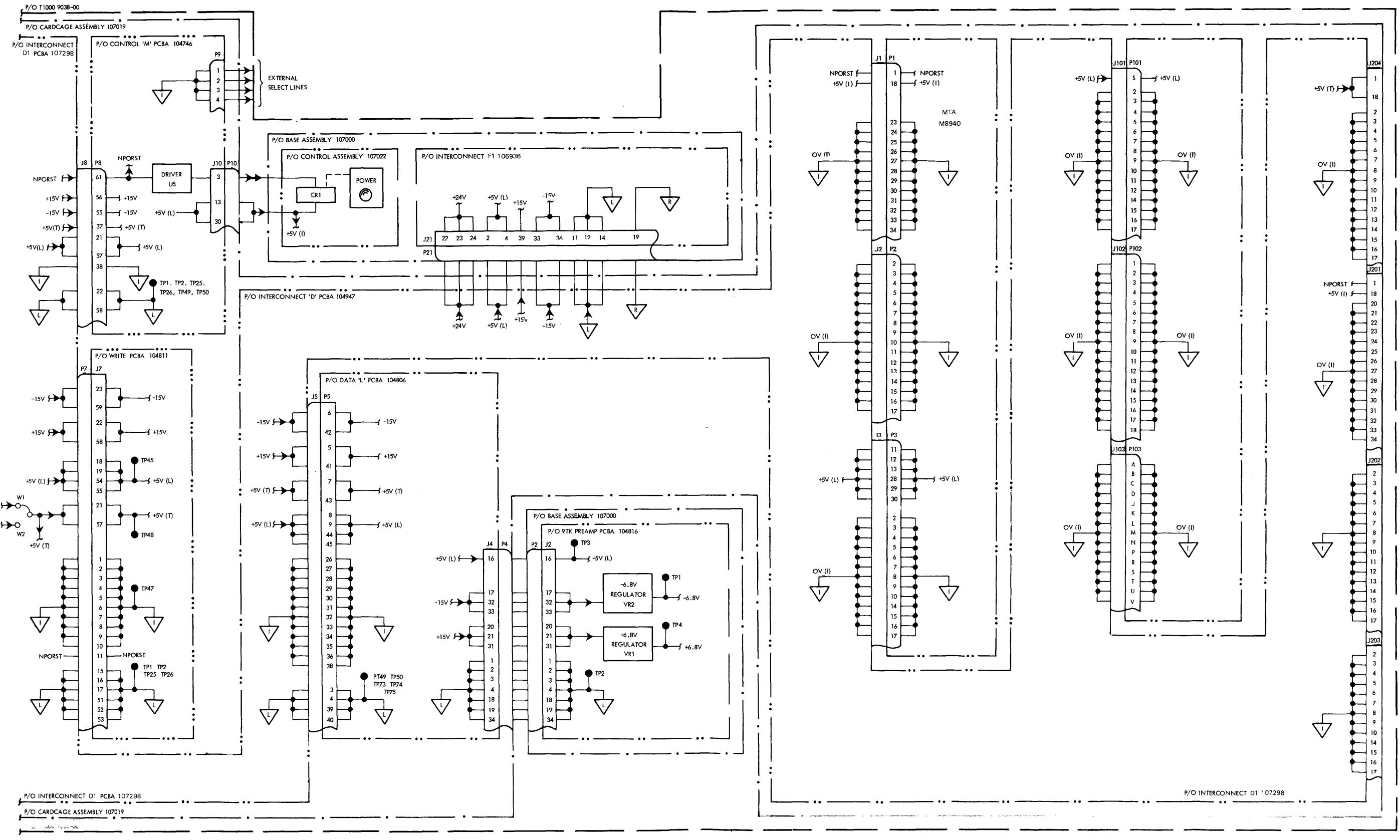
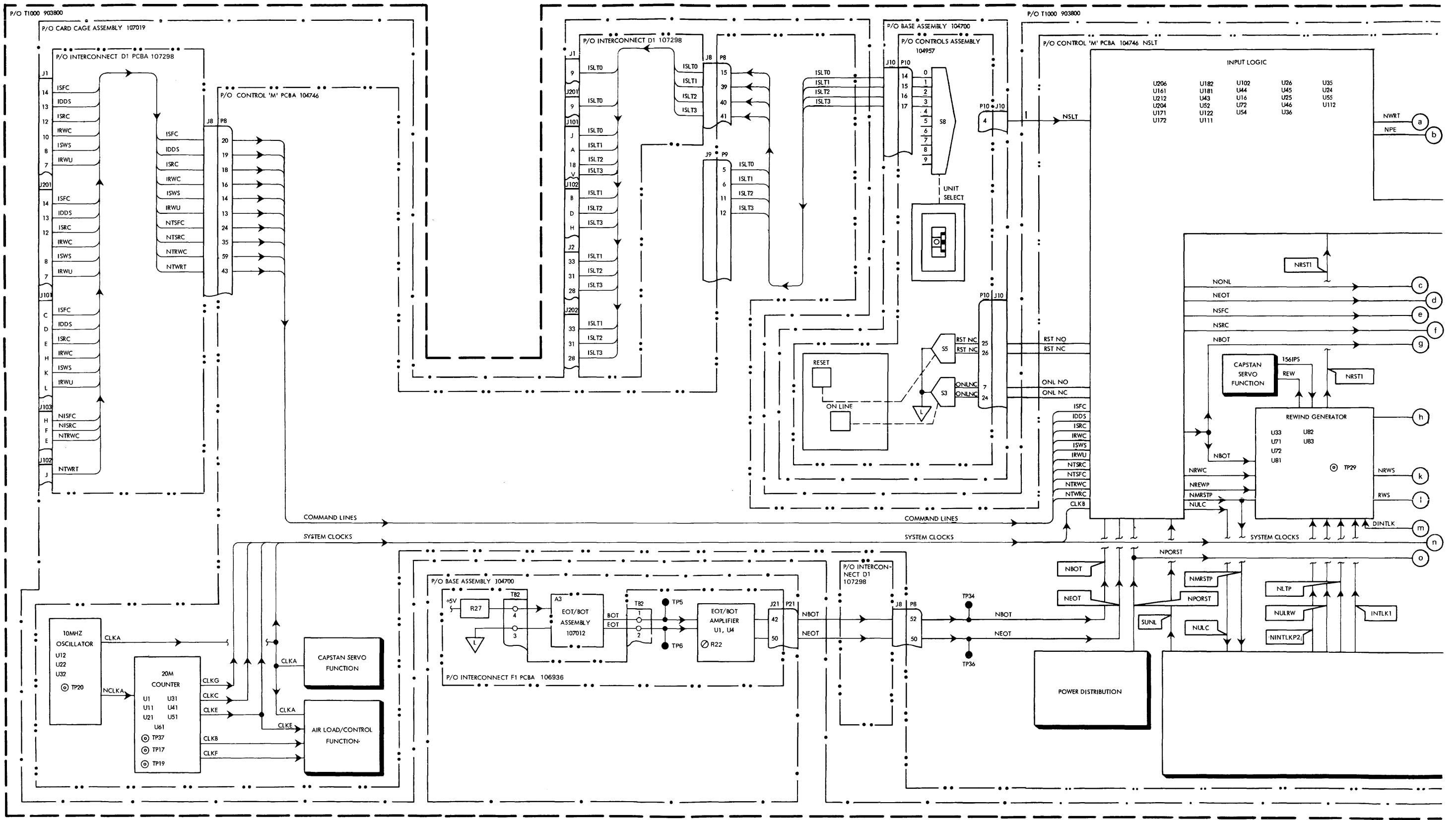


Figure 2 Power Supply and Distribution Functional Block Diagram (Sheet 2 of 2)



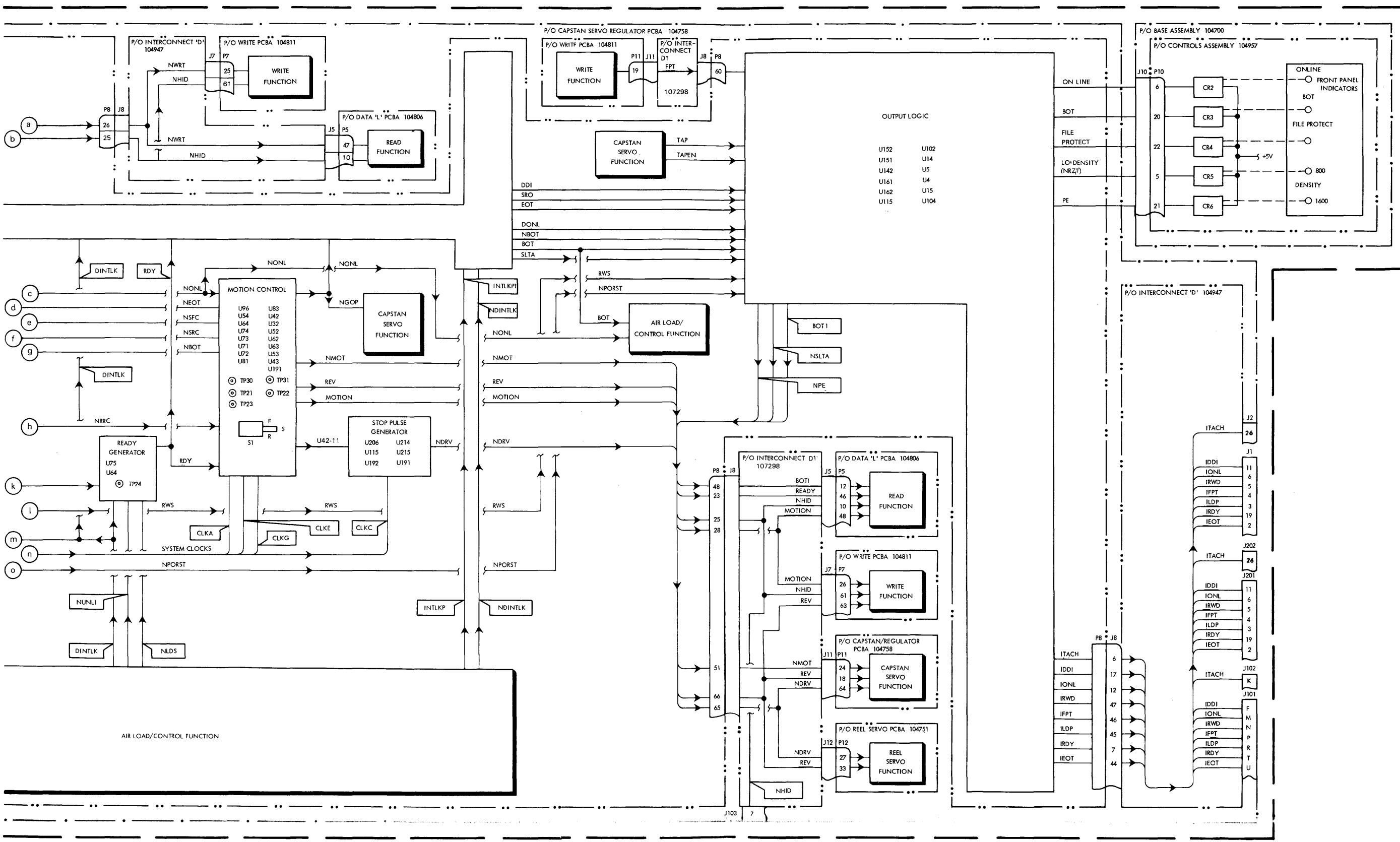


Figure 3 System Control Functional Block Diagram (Sheet 2 of 2)

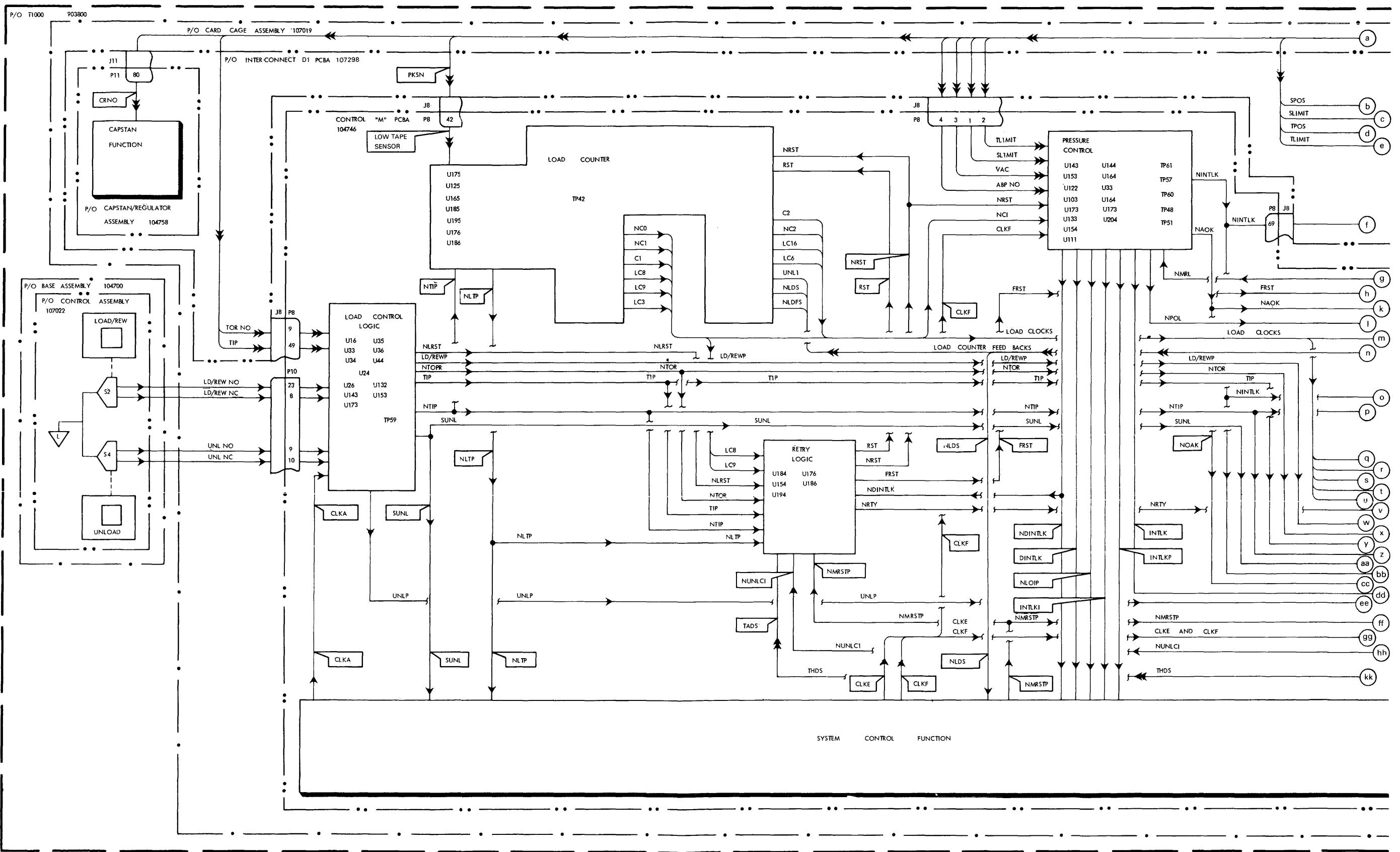


Figure 4 Air Load/Control Functional Block Diagram (Sheet 1 of 4)

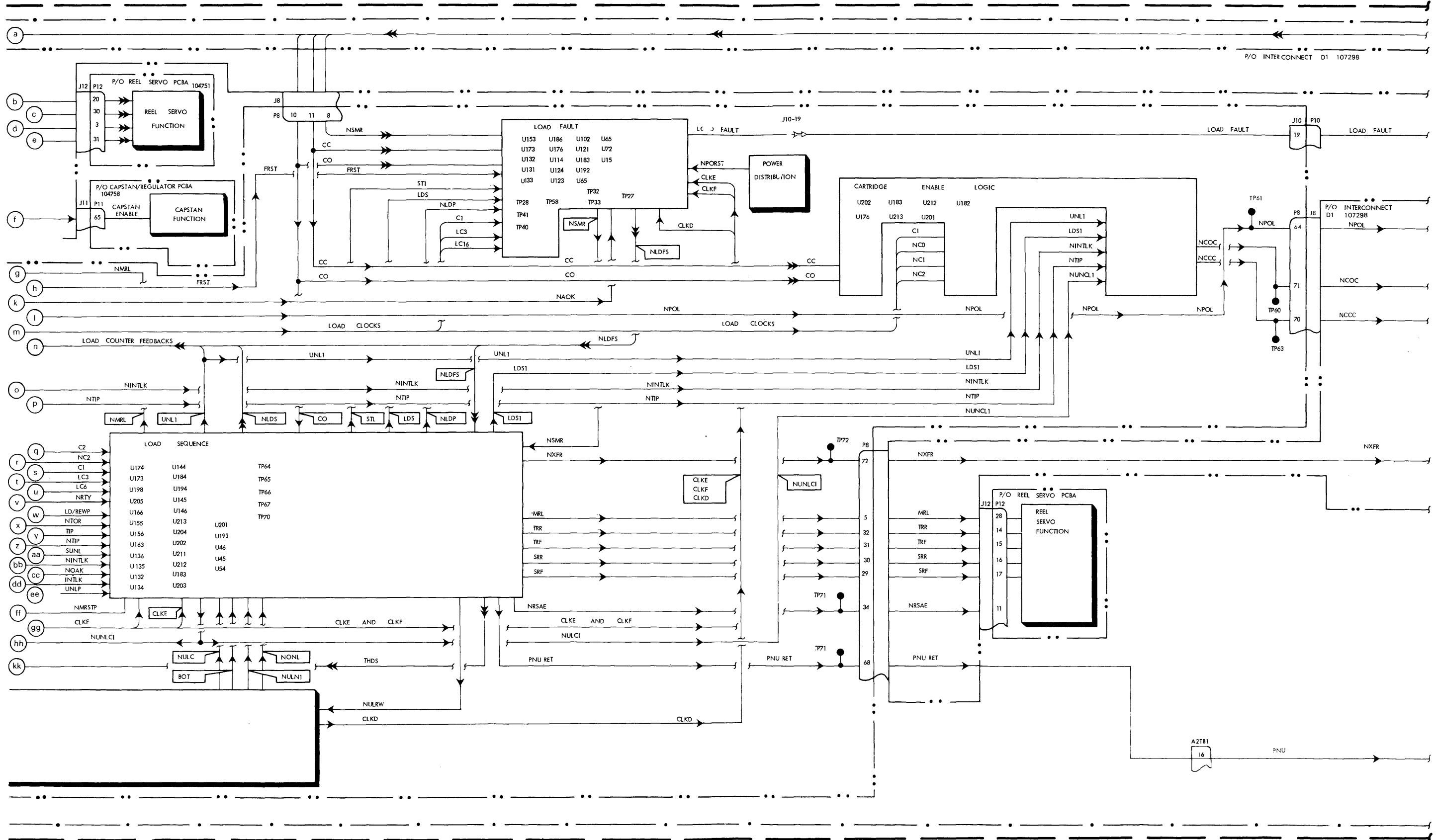


Figure 4 Air Load/Control Functional Block Diagram (Sheet 2 of 4)

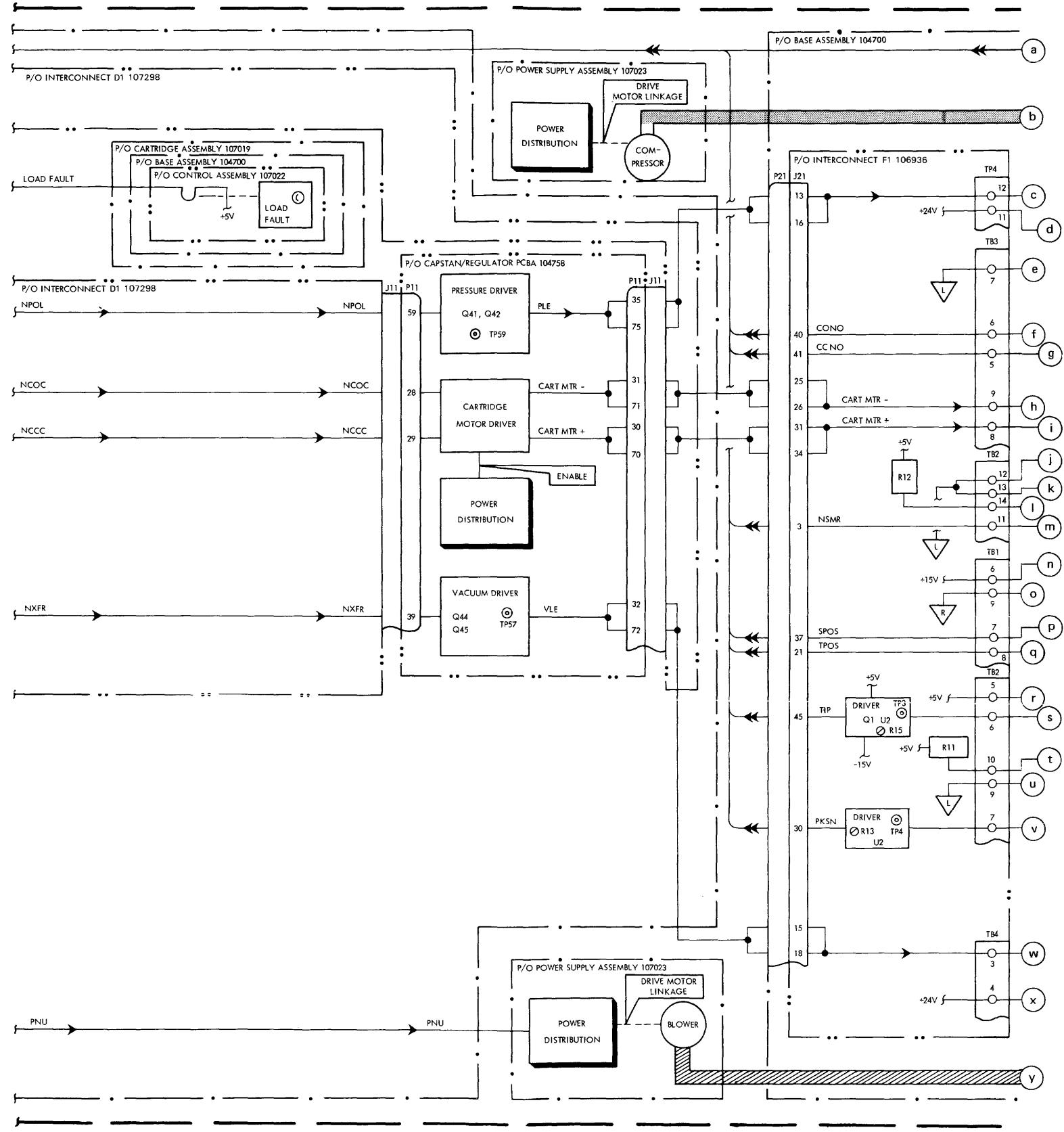


Figure 4 Air Load/Control Functional Block Diagram (Sheet 3 of 4)

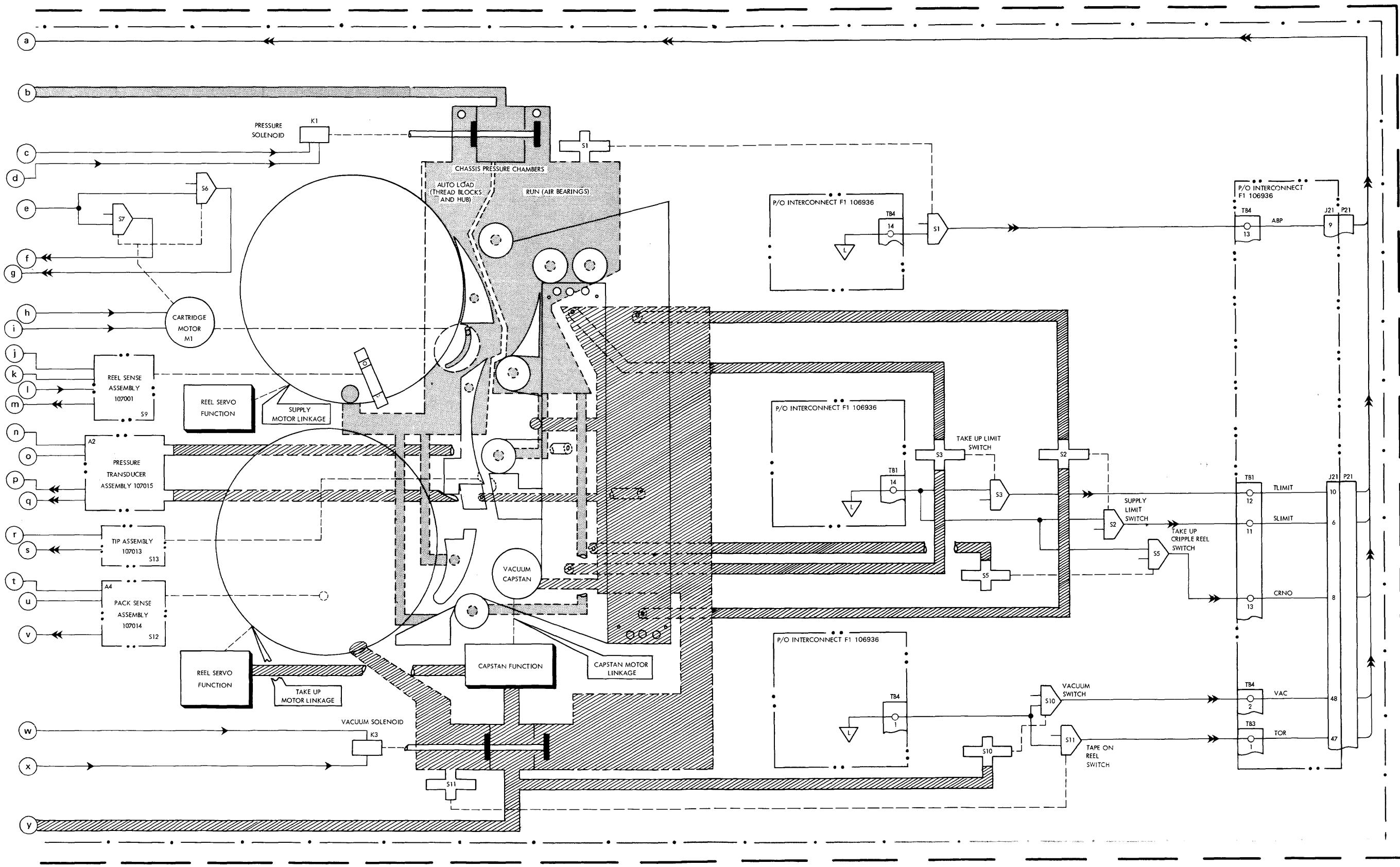
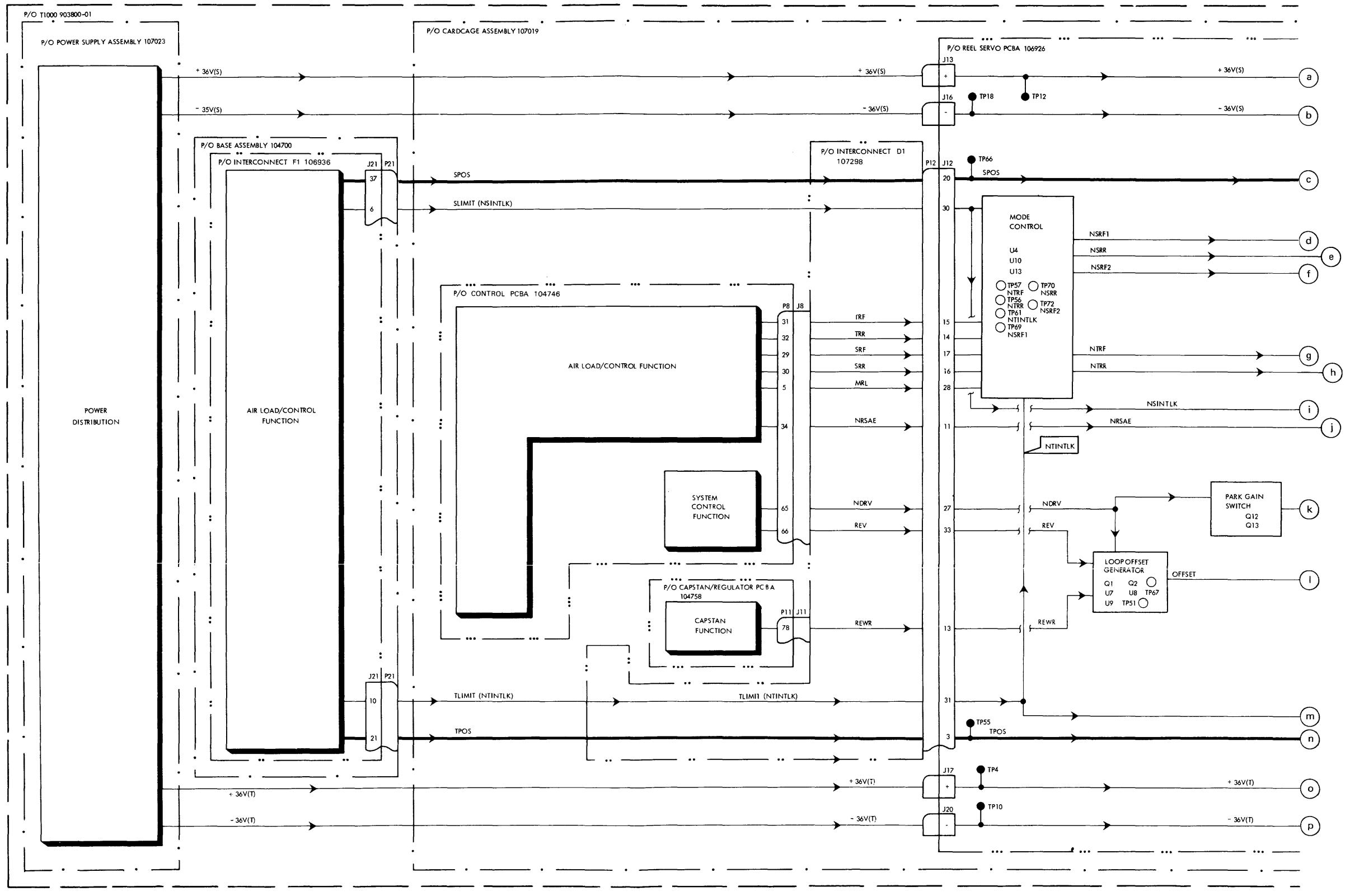


Figure 4 Air Load/Control Functional Block Diagram (Sheet 4 of 4)



MA-5789

Figure 5 Reel Servo Functional Block Diagram (Sheet 1 of 2)

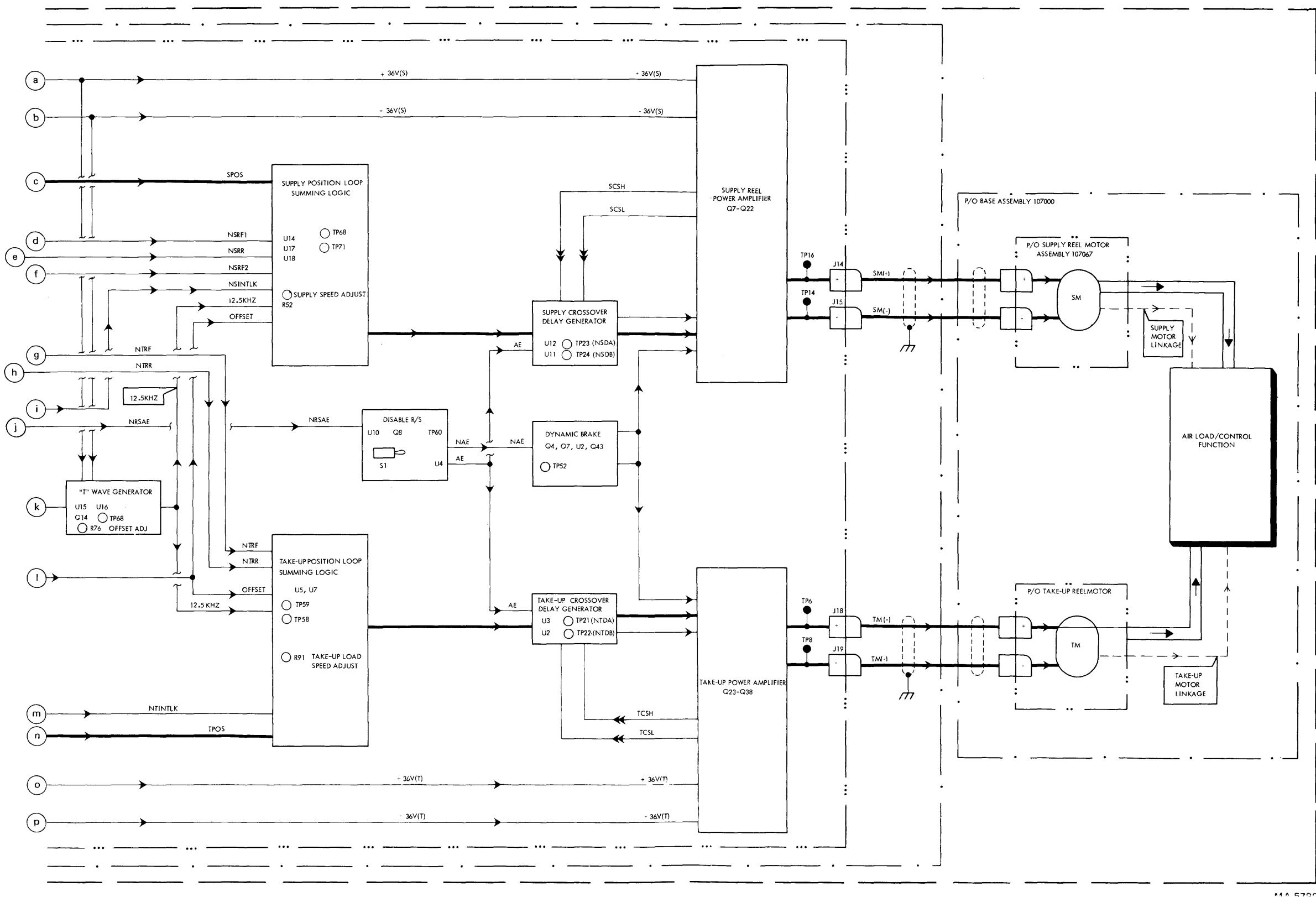
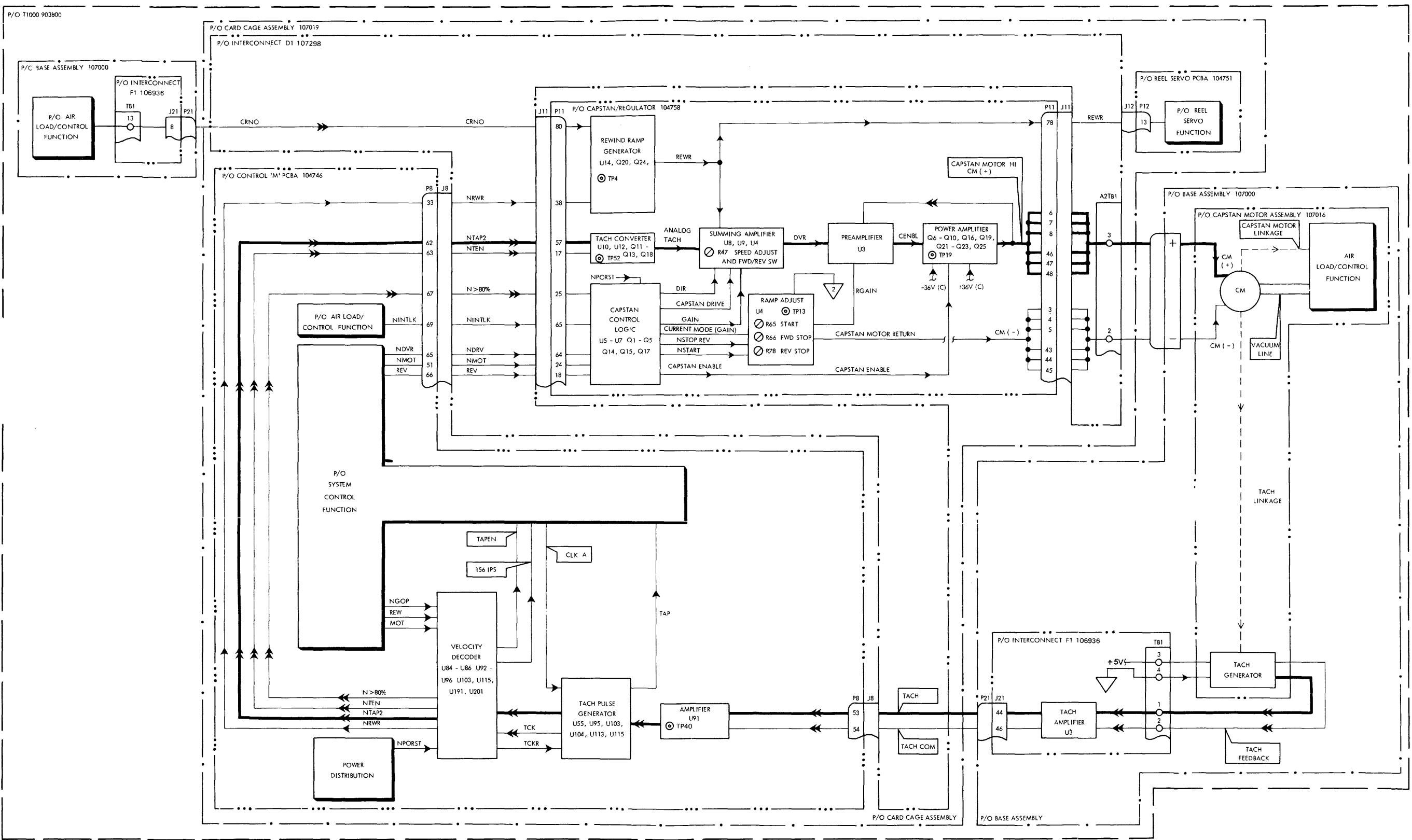


Figure 5 Reel Servo Functional Block Diagram (Sheet 2 of 2)



MA-5791

Figure 6 Capstan Servo Functional Block Diagram

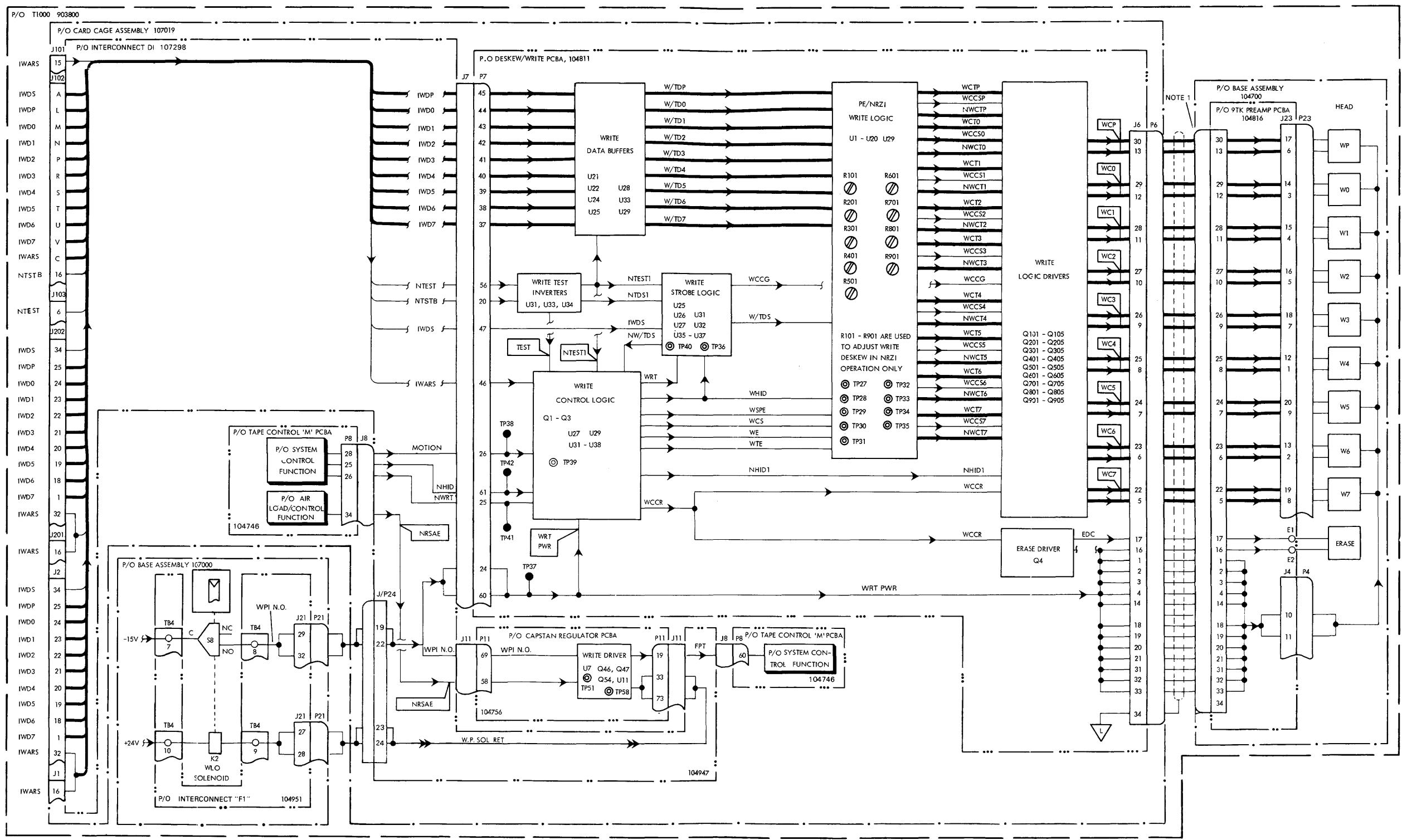


Figure 7 Write Functional Block Diagram

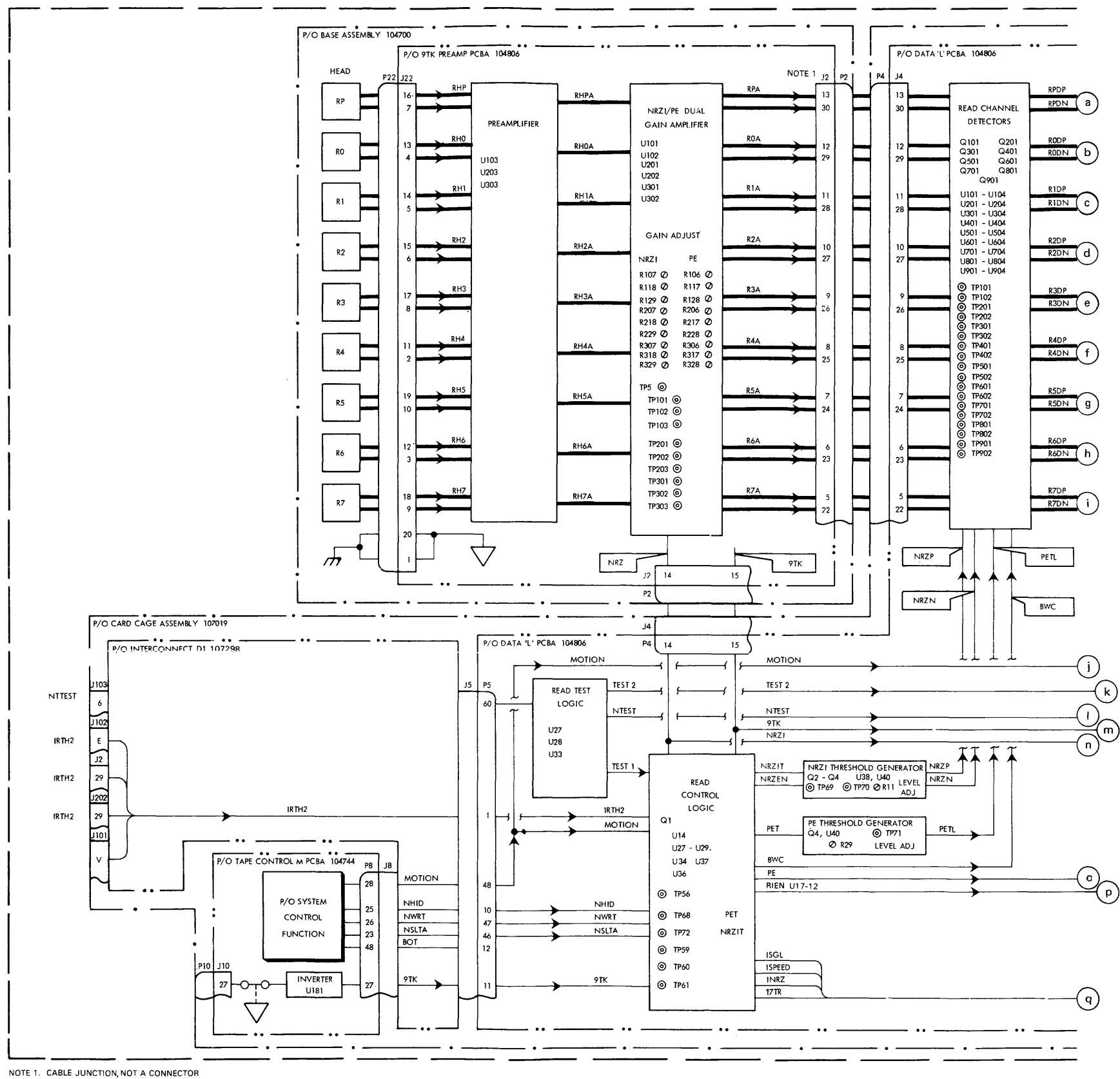


Figure 8 Read Functional Block Diagram (Sheet 1 of 2)

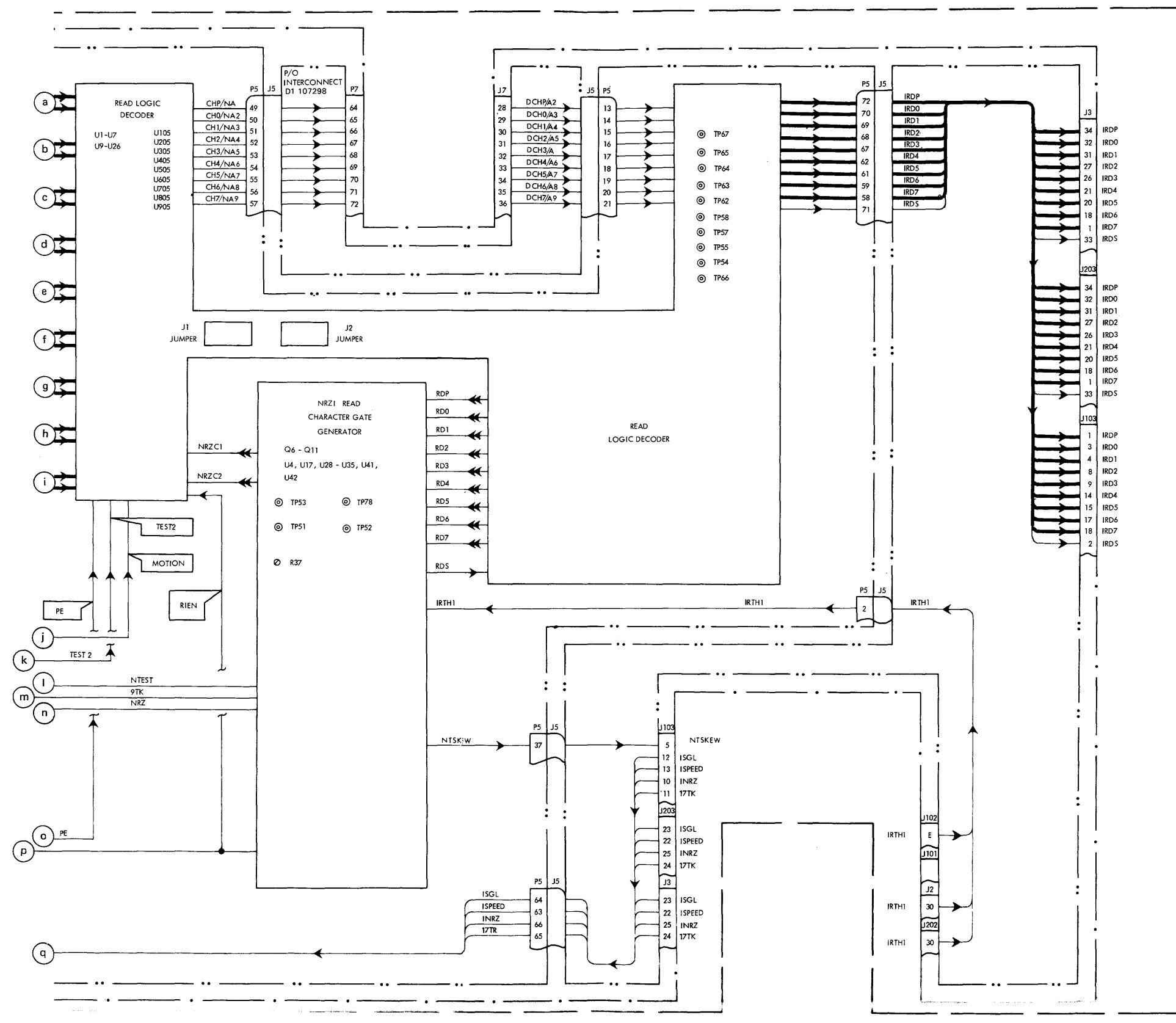


Figure 8 Read Functional Block Diagram (Sheet 2 of 2)

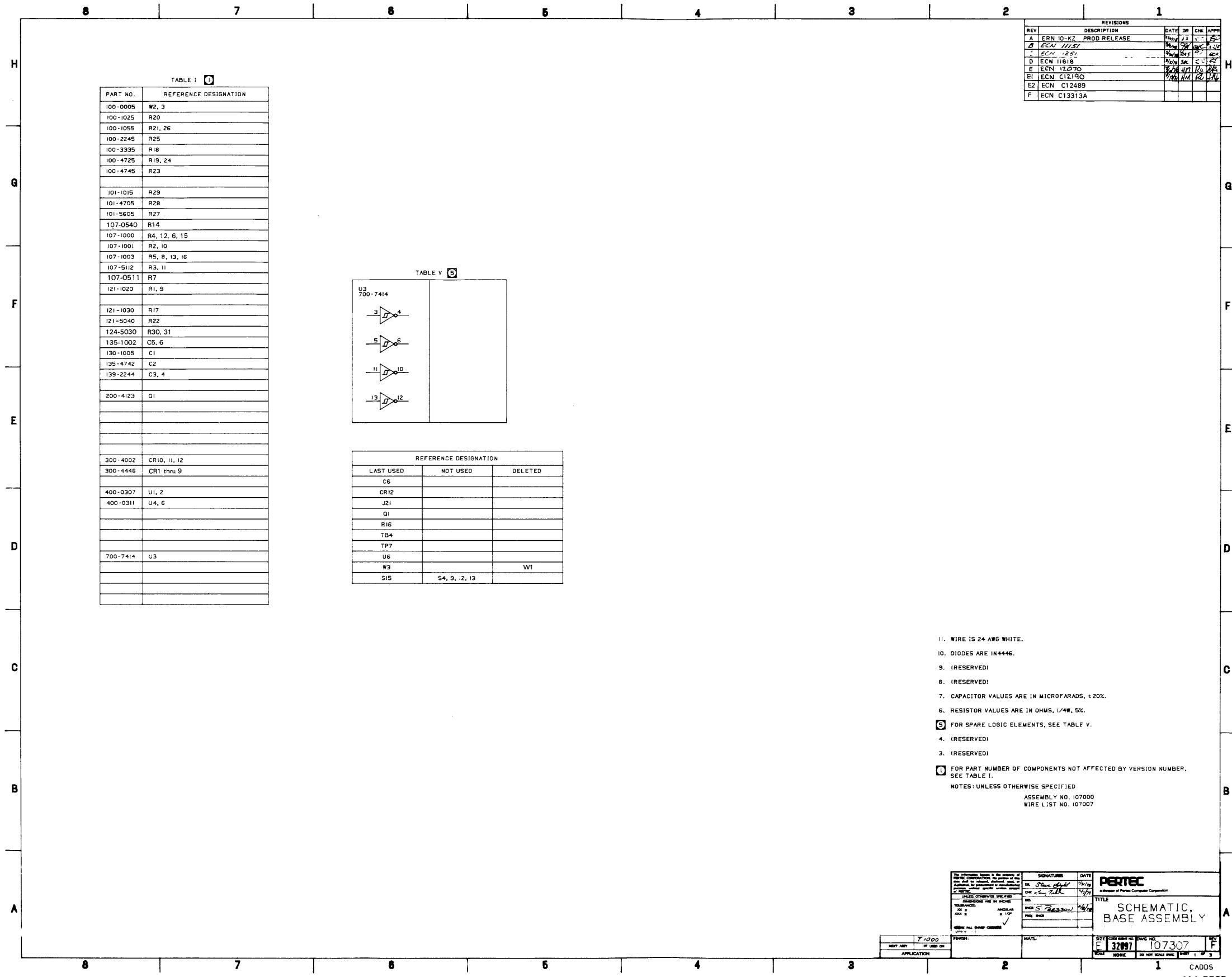


Figure 9 Schematic, Base Assembly (107307) (Sheet 1 of 3)

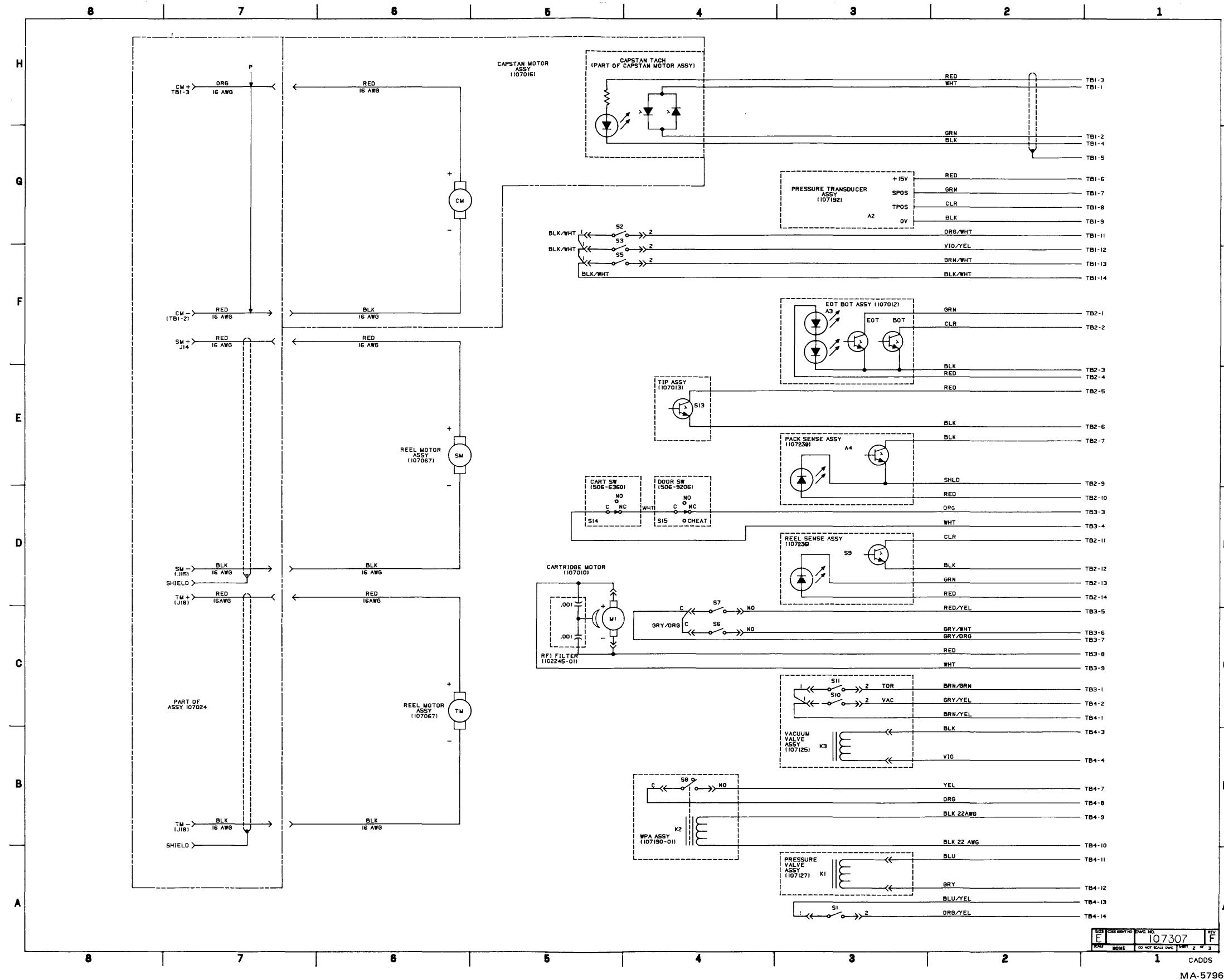


Figure 9 Schematic, Base Assembly (107307) (Sheet 2 of 3)

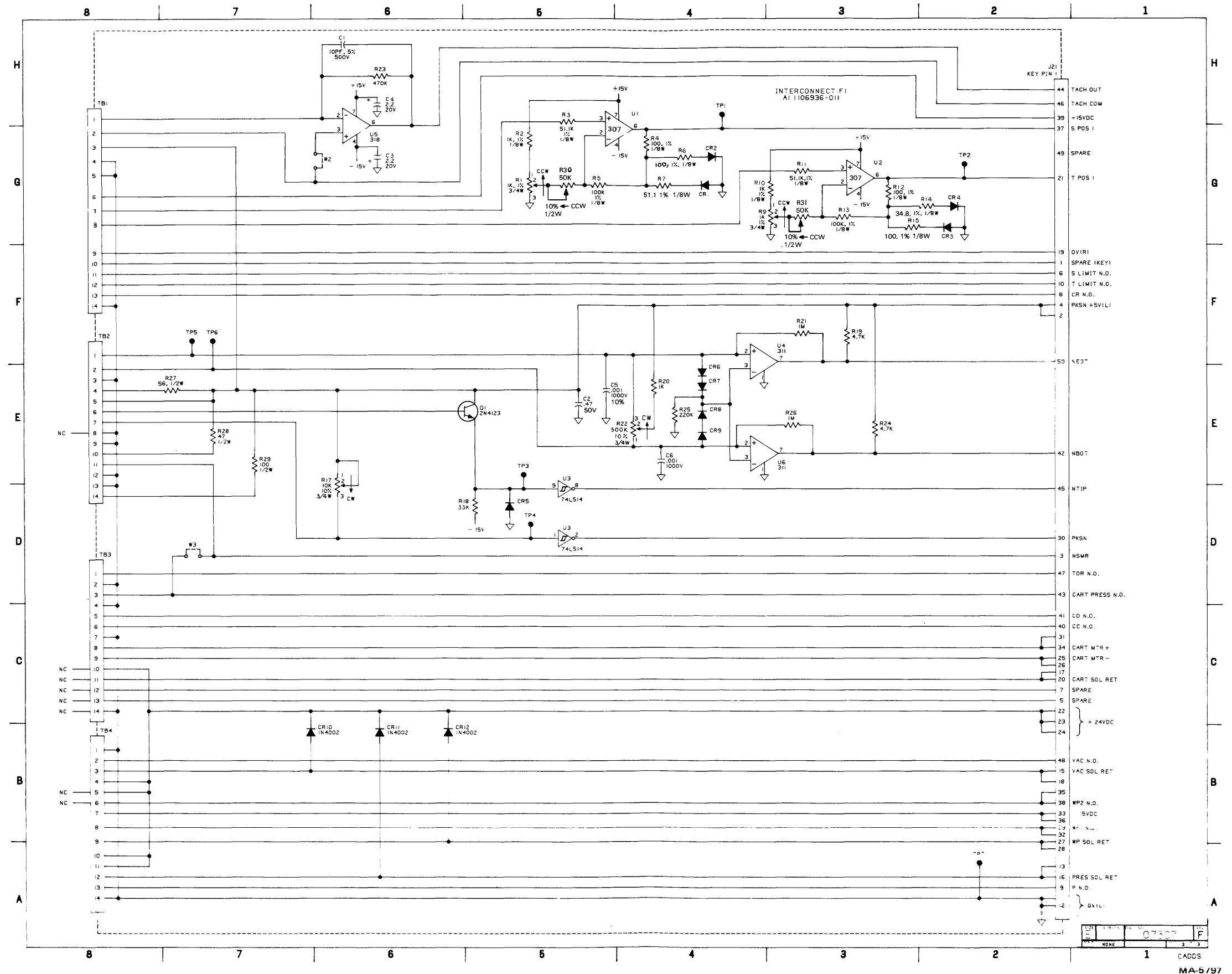


Figure 9 Schematic, Base Assembly (107307) (Sheet 3 of 3)

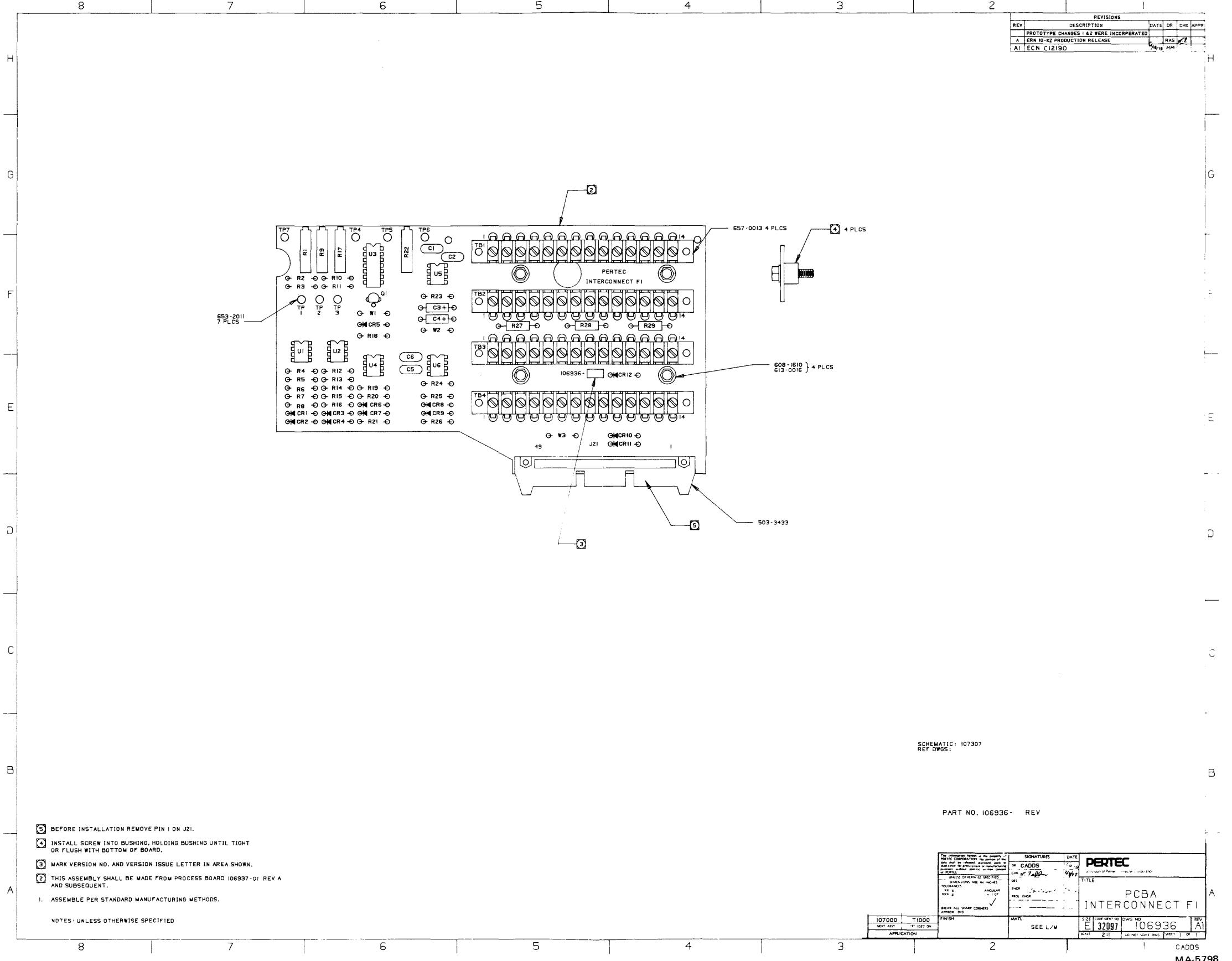


Figure 10 PCBA, Interconnect F1

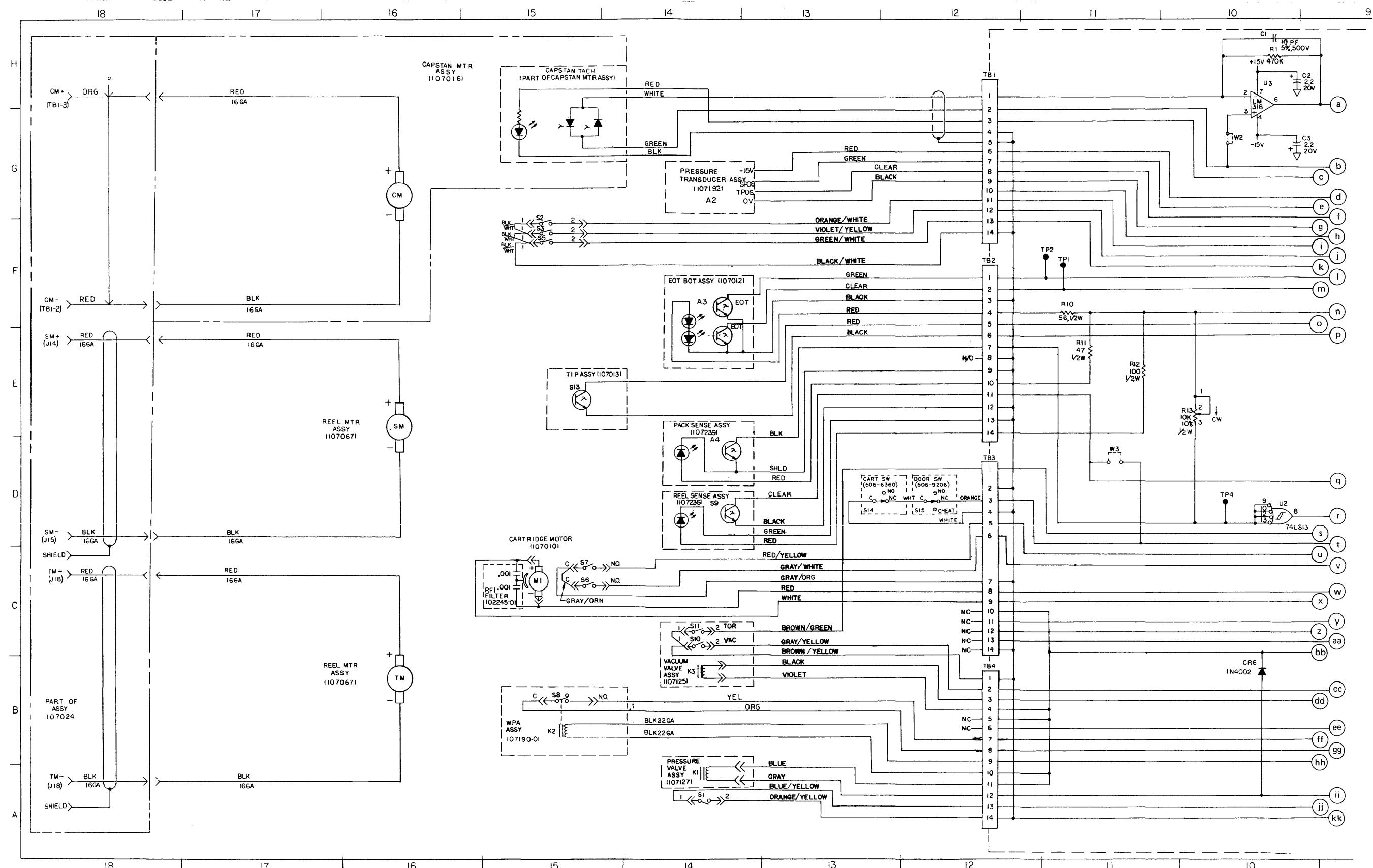


Figure 11 Schematic, Base Assembly (107189) (Sheet 1 of 2)

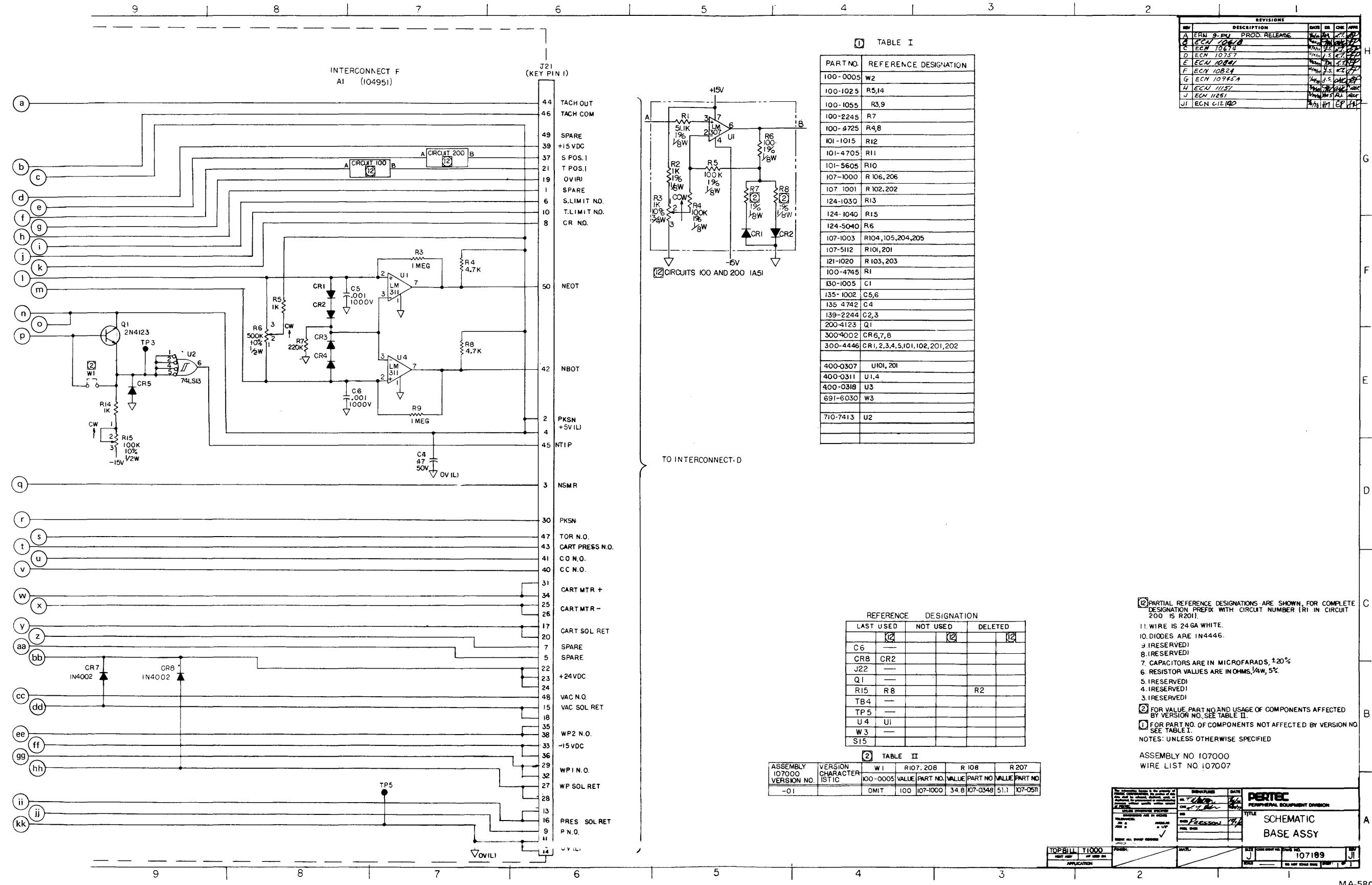


Figure 11 Schematic, Base Assembly (107189) (Sheet 2 of 2)

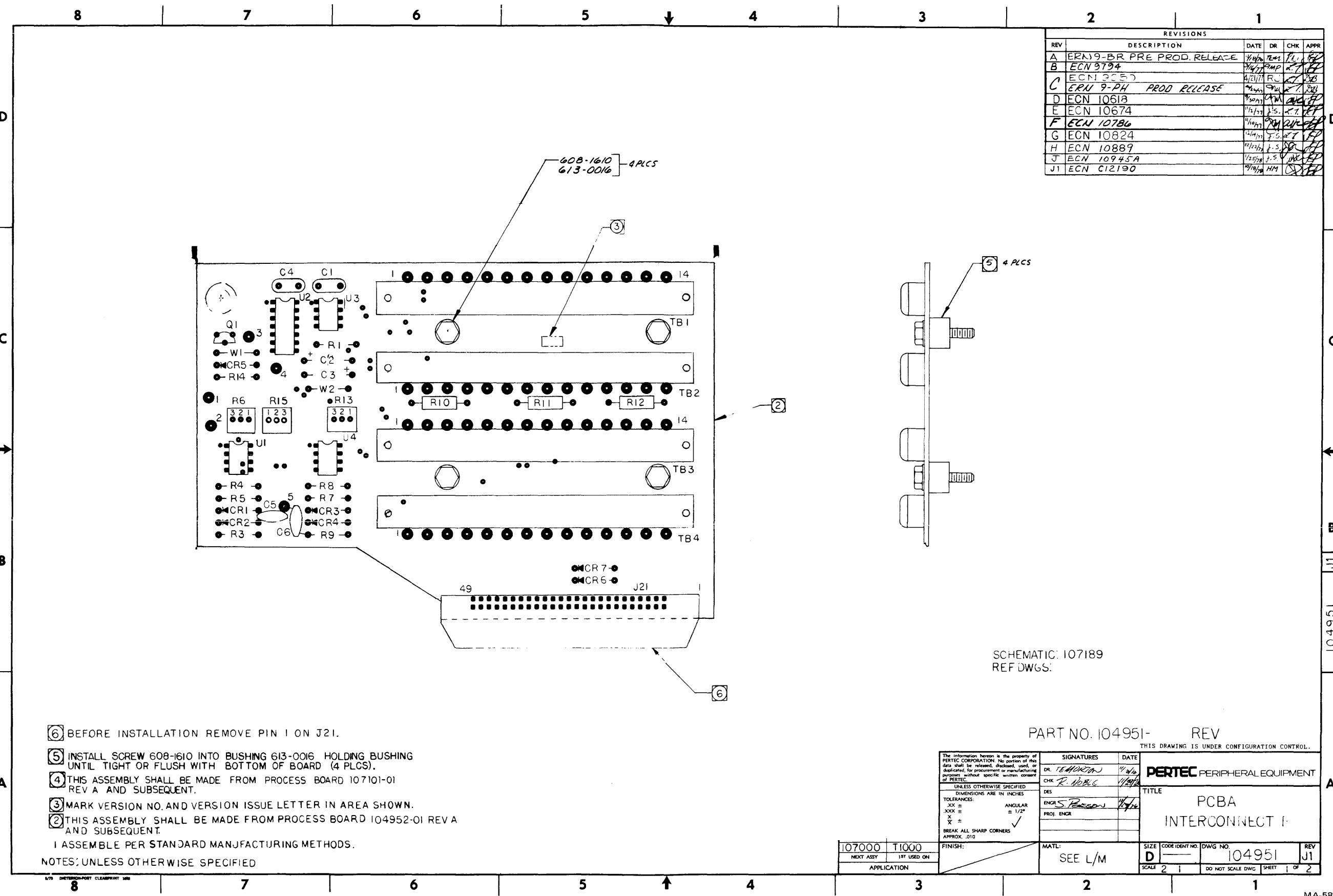


Figure 12 PCBA, Interconnect F (Sheet 1 of 2)

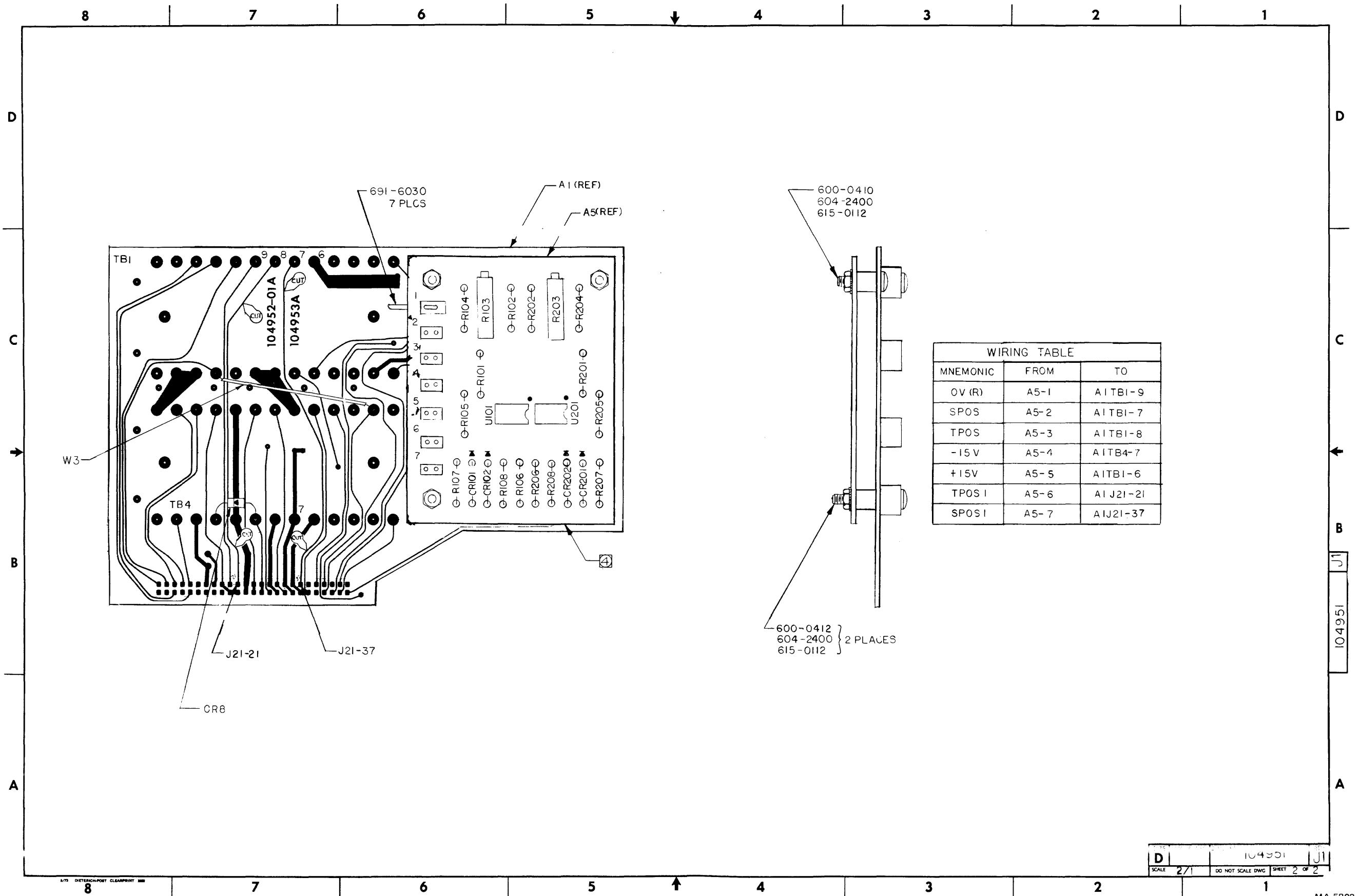


Figure 12 PCBA, Interconnect F (Sheet 2 of 2)

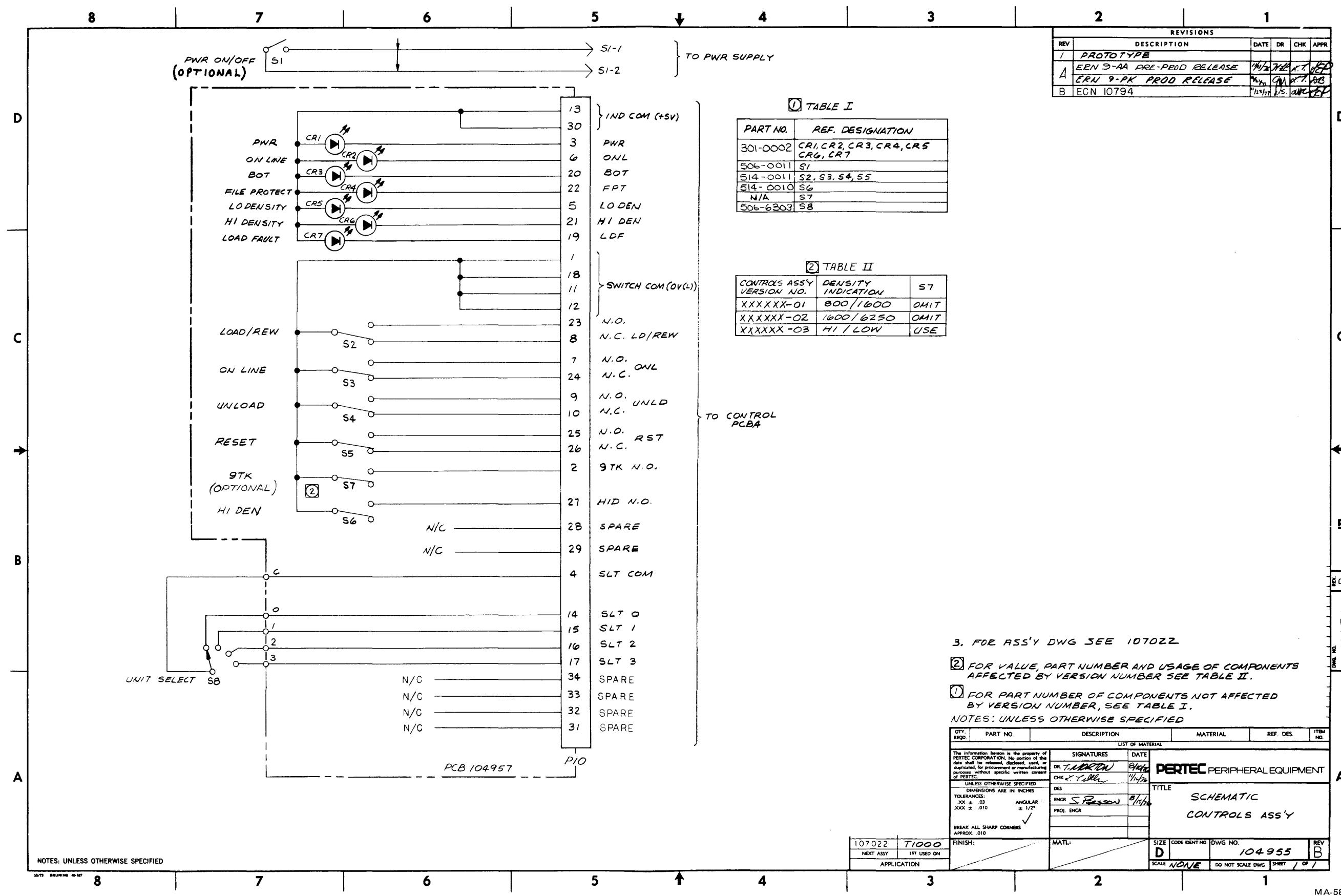


Figure 13 Schematic, Controls Assembly

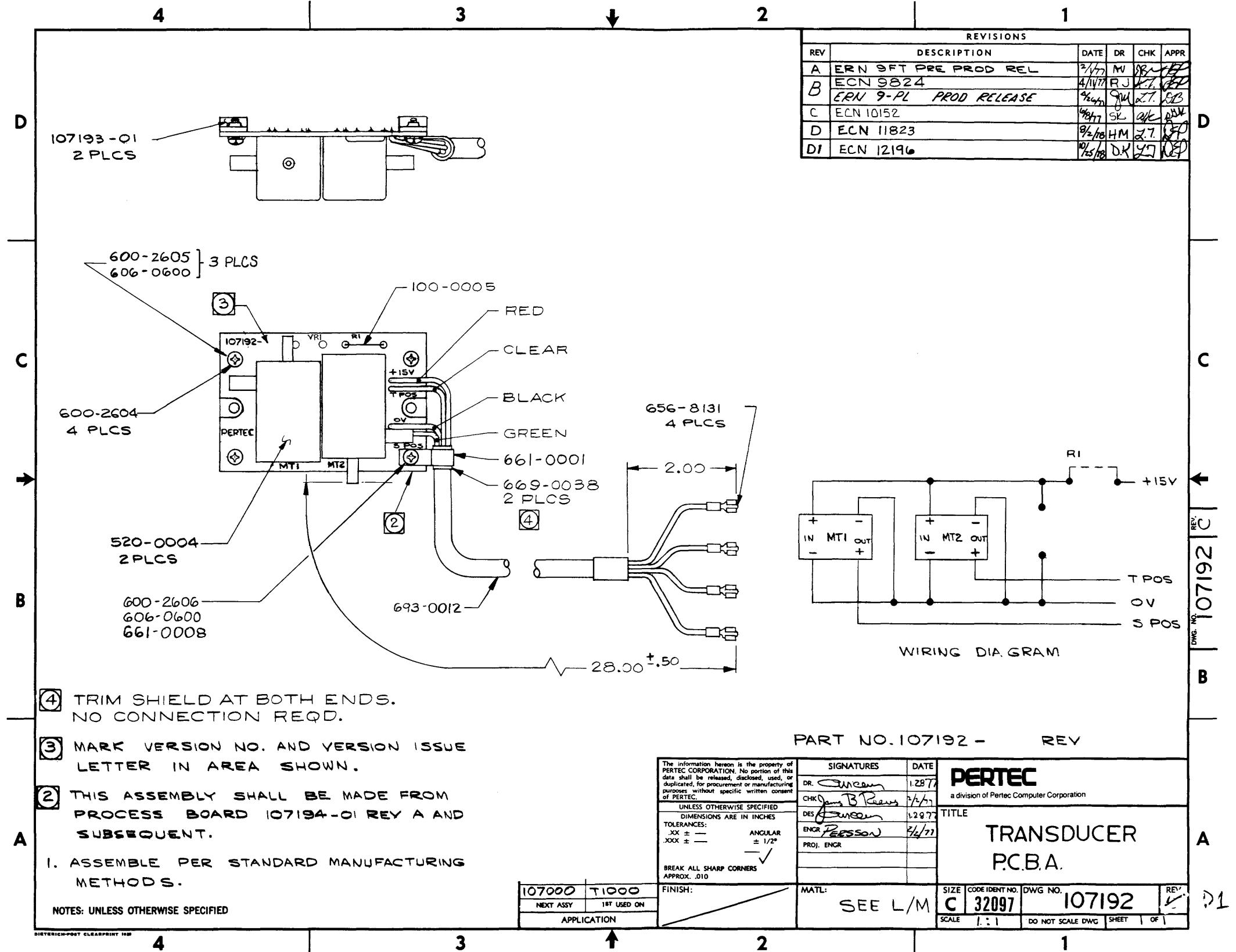
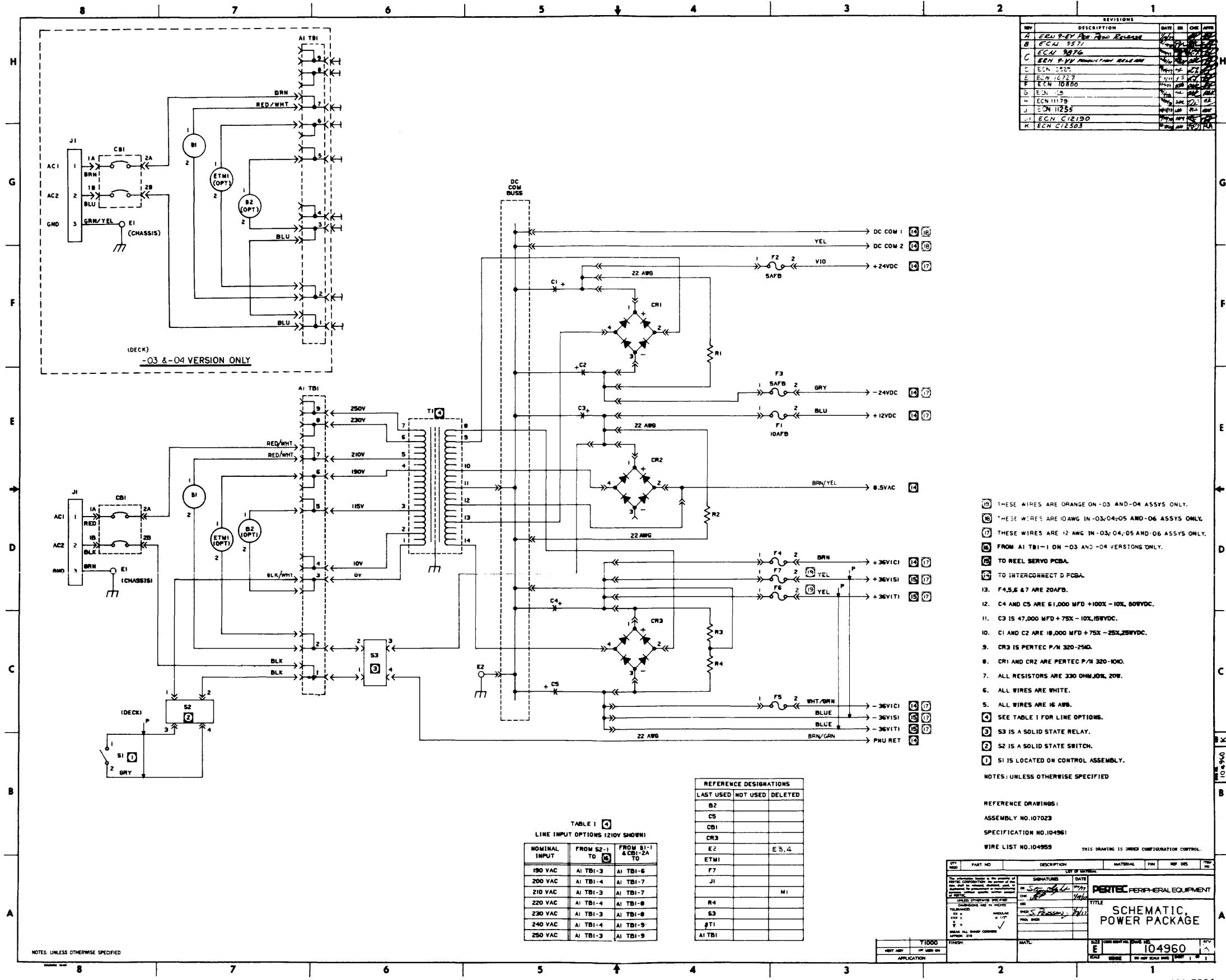


Figure 14 PCBA, Transducer



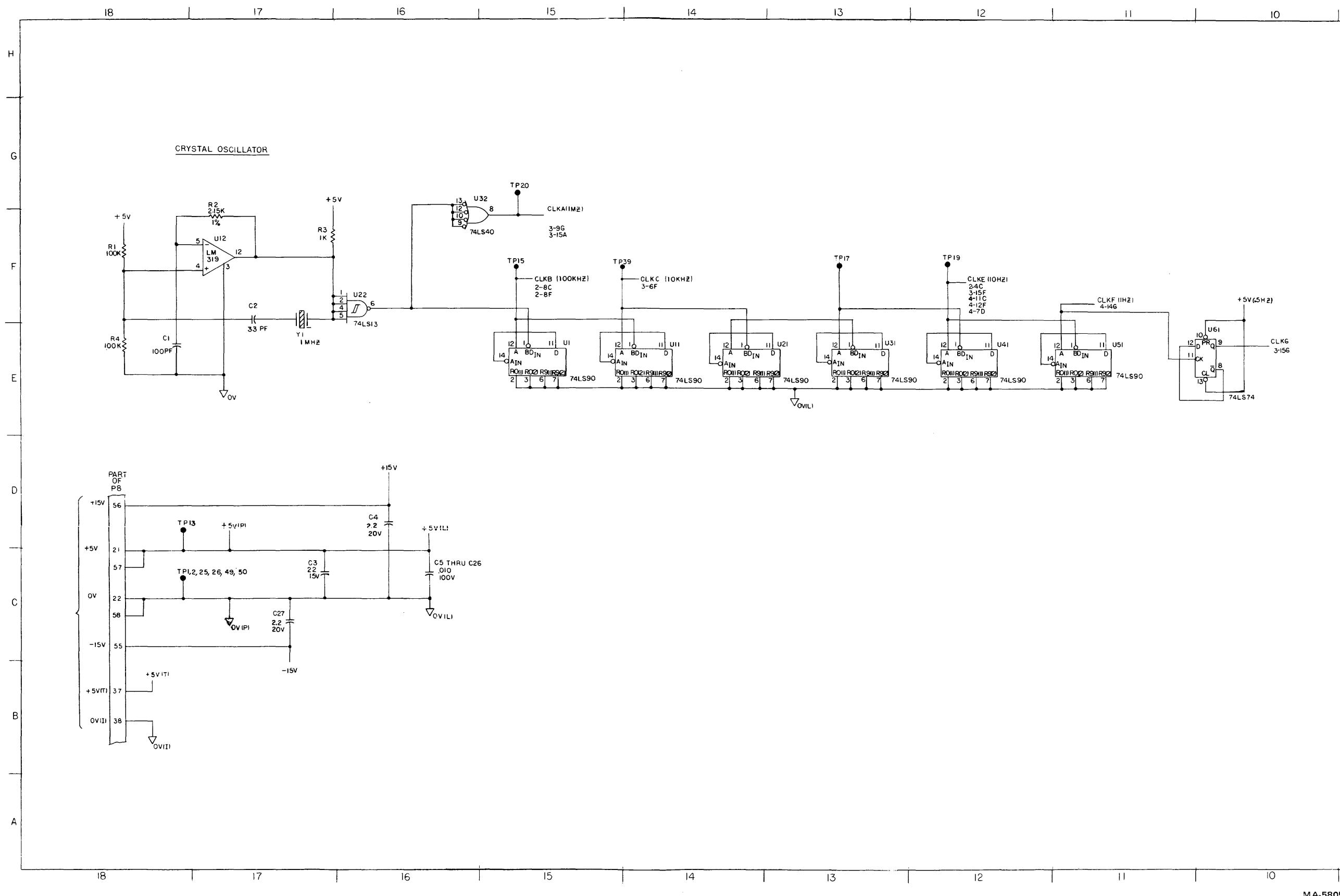


Figure 16 Schematic, Control M (Sheet 1 of 10)

9 8 7 6 5 4 3 2

TABLE I [1]

REFERENCE DESIGNATION		
100-1015	R5 THRU 11	
100-1025	R3	
100-1035	R4, 16	
100-1045	R1, 4, 15	
	R25	
100-4725	R17, 18, 13	
	R19 THRU R24	
10F-2151	R2	
120-0038	U16, 96, 143, 206	
130-3305	C2	
130-1015	C1	
132-2752	C32, 33, 37, 38	
135-1031	C5 THRU 26, 29, 30, 31, 34, 35, 36, 46, 47	
139-2244	C4, 27	
139-2262	C3	
330-0475	VR1	
400-0318	U91	
400-0319	U12	
514-0008	S1	
524-1000	Y1	
700-5452	U4, 5, 14, 15, 141, 142, 151, 152, 211	
700-7400	U65	
710-0332	U171	
710-4119	U163, 214, 215	
710-7400	U24, 33, 42, 43, 45, 53, 54, 74, 83, 108, 111, 113, 125, 131, 133, 144, 156, 175, 183, 186, 195, 194, 201, 203, 213	
710-7404	64, 72, 102, 104, 132, 155, 173, 176, 181, 184, 191,	
710-7410	U46, 71, 114, 134, 172, 174, 182, 202, 56, 233, 116	
710-7413	U22, 112	
710-7420	U73, 208	
710-7430	U105, 121	
710-7440	U55, 32, 154	
710-7442	U185	
710-7474	U25, 26, 34, 35, 36, 61, 62, 63, 81, 82, 92, 93, 94, 95, 113, 122, 126, 135, 136, 145, 146, 164, 166, 192, 196, 205	
710-7490	U1, 11, 21, 31, 41, 51, 165	
710-7499	U84, 85, 86, 123, 124, 195, 76, J01	
710-7414	U153, 44, 212	

TABLE III [4]

OPTION	CODE	OMIT
SELECTABLE	A	W17
PERMANENT STATUS	B	W1
REMOTE DENSITY	C	W2
ON LINE AT BOT	D	W3
REMOTE 7TK/9K	E	W4

TABLE II [2]

MODEL	SPD (IPS)	OPTION CODE [4]	ASSEMBLY 104746 VERSION NO.	100-0005												691-6030	R19 THRU 100-1015	R24 135-1031	C39 THRU C45	C35	R25	R26		
				W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17				
STD	I25	A	-01	USE	USE	USE	USE	OMIT	USE	USE	OMIT	OMIT	OMIT	USE	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	135-1031	.01	USE	USE
STD	I25	B,C	-02	OMIT	OMIT	USE	USE	OMIT	USE	USE	OMIT	OMIT	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	USE	135-1002	.001	OMIT	OMIT
STD	I25	A,C	-03	USE	OMIT	USE	USE	OMIT	USE	USE	OMIT	OMIT	OMIT	USE	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	.01	USE	USE
GCR	I25	A	-11	USE	USE	USE	USE	USE	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	.01	USE	USE
GCR	I25	B,C	-12	OMIT	OMIT	USE	USE	USE	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	OMIT	OMIT	USE	USE	USE	USE	.001	OMIT	OMIT
GCR	I25	A,C	-13	USE	OMIT	USE	USE	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT	.01	USE	USE
STD	75	A	-21	USE	USE	USE	USE	USE	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	USE	USE	USE	OMIT	OMIT	OMIT	.01	USE	USE
STD	75	B,C	-22	OMIT	OMIT	USE	USE	USE	OMIT	USE	OMIT	OMIT	OMIT	USE	USE	OMIT	OMIT	USE	OMIT	OMIT	OMIT	.01	OMIT	OMIT
GCR	75	A	-31	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	OMIT	OMIT	OMIT	.01	OMIT	OMIT
GCR	75	B,C	-32	OMIT	OMIT	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	USE	OMIT	OMIT	OMIT	.01	OMIT	OMIT

TABLE IV [4]

I.C. VOLTAGE AND GROUND PIN NO.					
TYPE	+5V(L)	+15V	0VL	-15V	OV(+) +5V(+)
LMB18		7		4	
LMB19		11		6	
120-0028	14				
74LS00	14		7		
74LS04	14		7		
74LS10	14		7		
74LS20	14		7		
74LS30	14		7		
74LS40	14		7		
74LS42	14		7		
74LS74	14		7		
74LS90	5		10		
74LS93	16		8		
75452	8		4		
74LS14	14		7		
74LS132	14		7		
120-0001				7	14

REFERENCE DESIGNATION

LAST USED	NOT USED	DELETED
C47		C28
R26		R12
S1		
U215	[1]	
W17		
TP72	TP3 THRU 12, 14, 43	
VR1		

[5] TABLE V

TYPE	REFERENCE DESIGNATION
120-0028	U14B, I, K, L, M, U20L, U16H
120-0001	U16K, U16A, B, C, D, E, F, G, H
74LS00	U120, U748
74LS04	U102, U14E, U72C, U18F, U102
74LS13	U228
74LS42	U226
74LS74	U61B, U1358, U166A
75452	U148, U211A
74LS14	U440

Figure 16 Schematic, Control M (Sheet 2 of 10)

REV	DESCRIPTION	REV	CHG	APP
A				

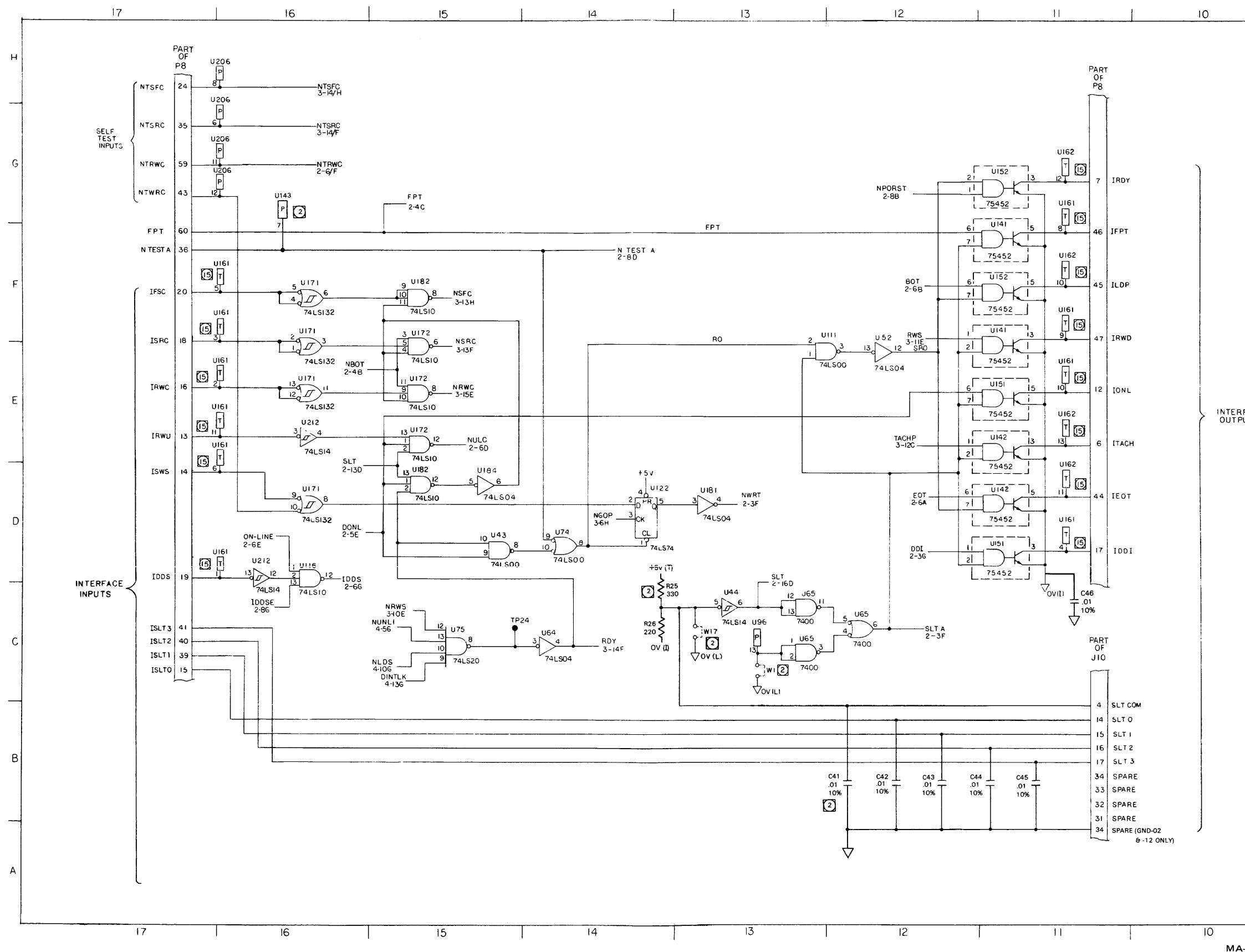


Figure 16 Schematic, Control M (Sheet 3 of 1)

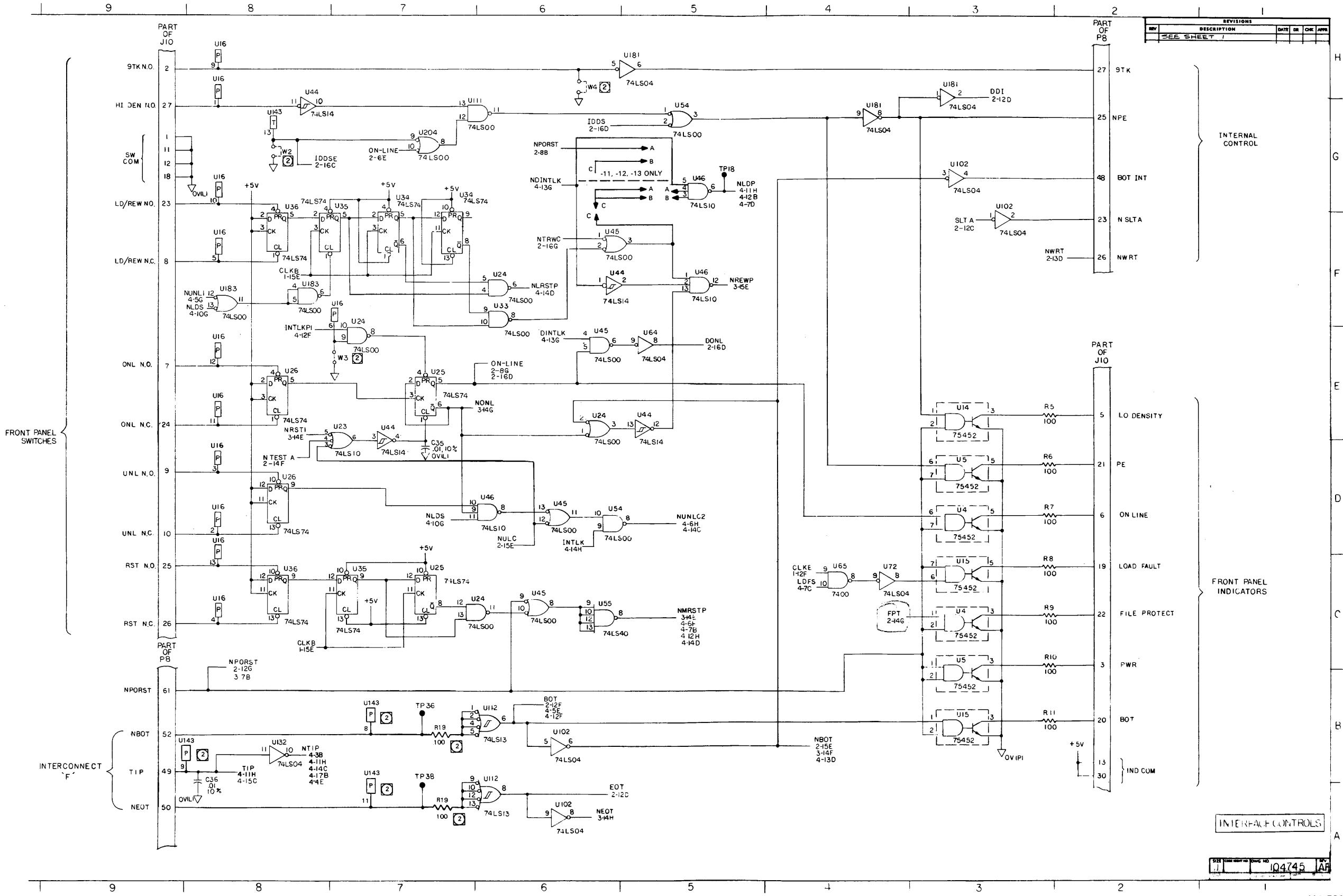


Figure 16 Schematic, Control M (Sheet 4 of 1)

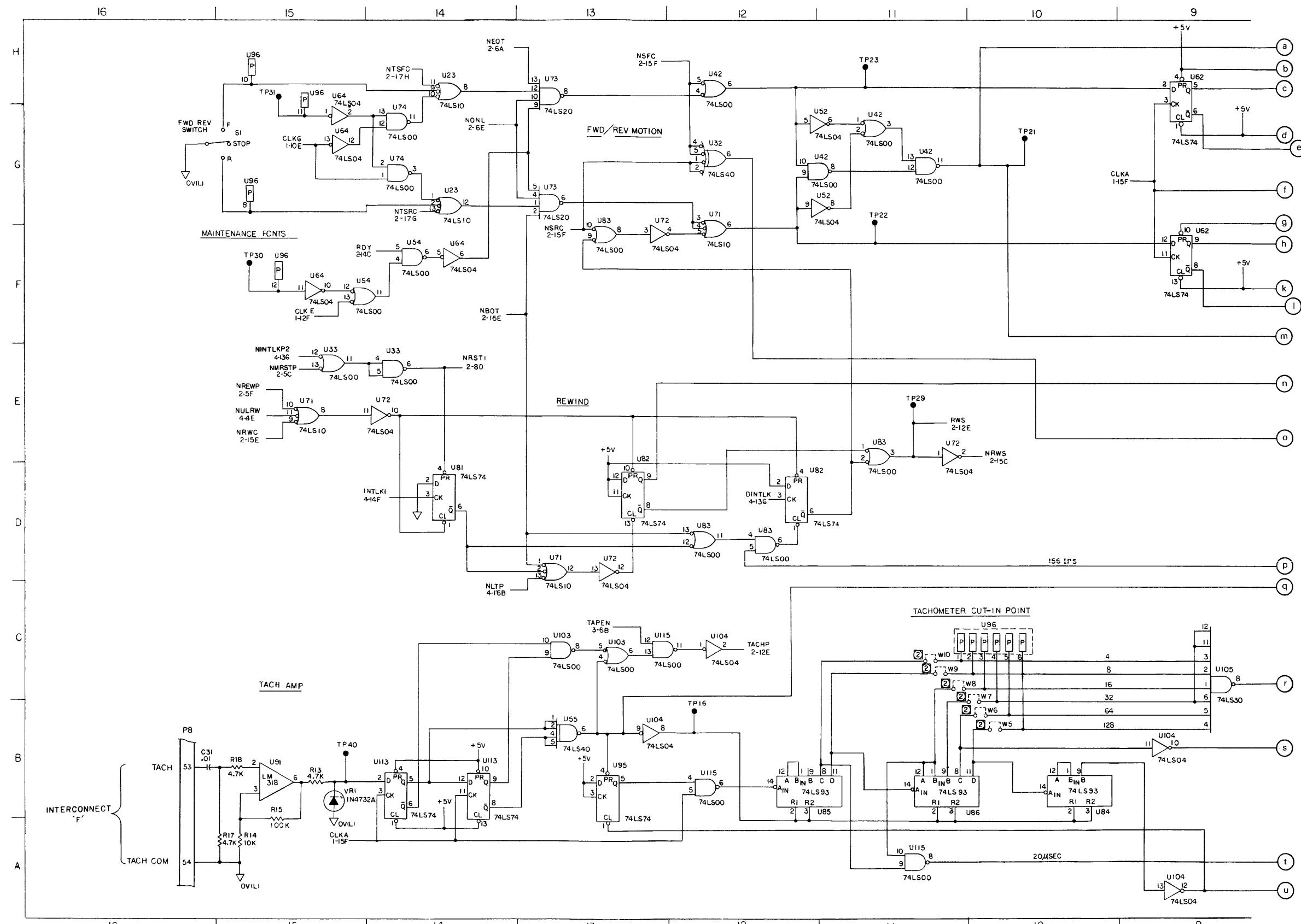


Figure 16 Schematic, Control M (Sheet 5 of 10)

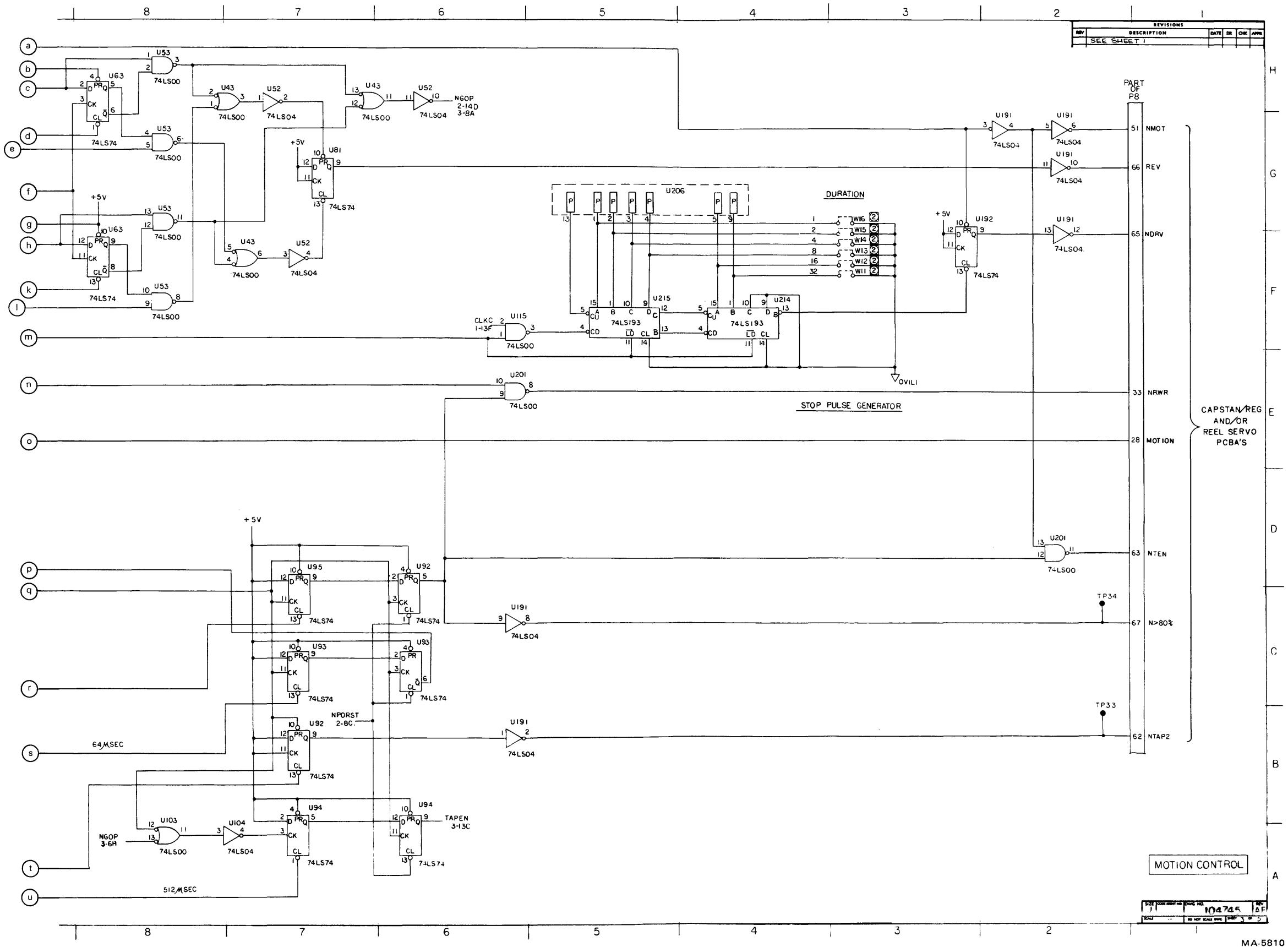


Figure 16 Schematic, Control M (Sheet 6 of 10)

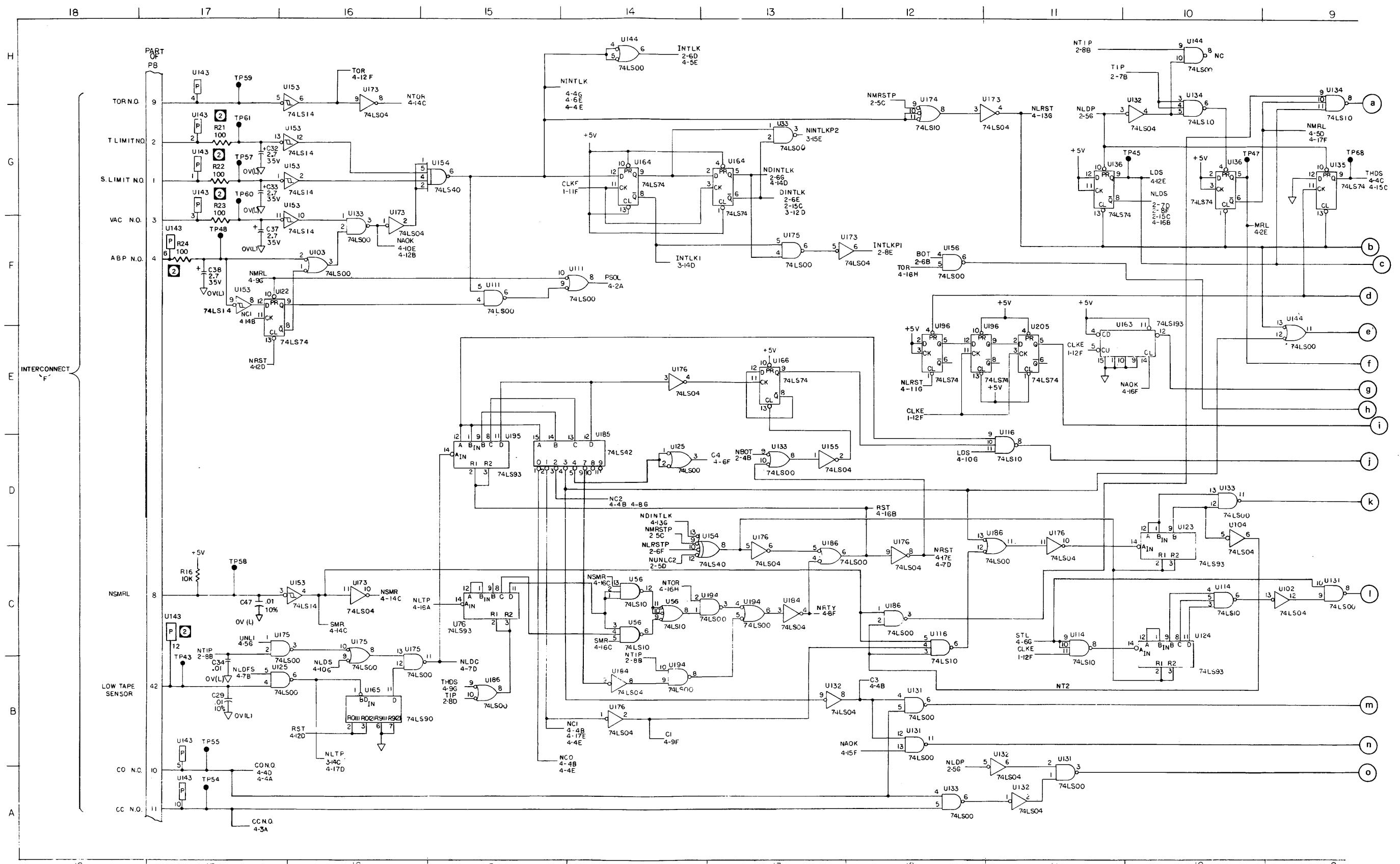


Figure 16 Schematic, Control M (Sheet 7 of 10)

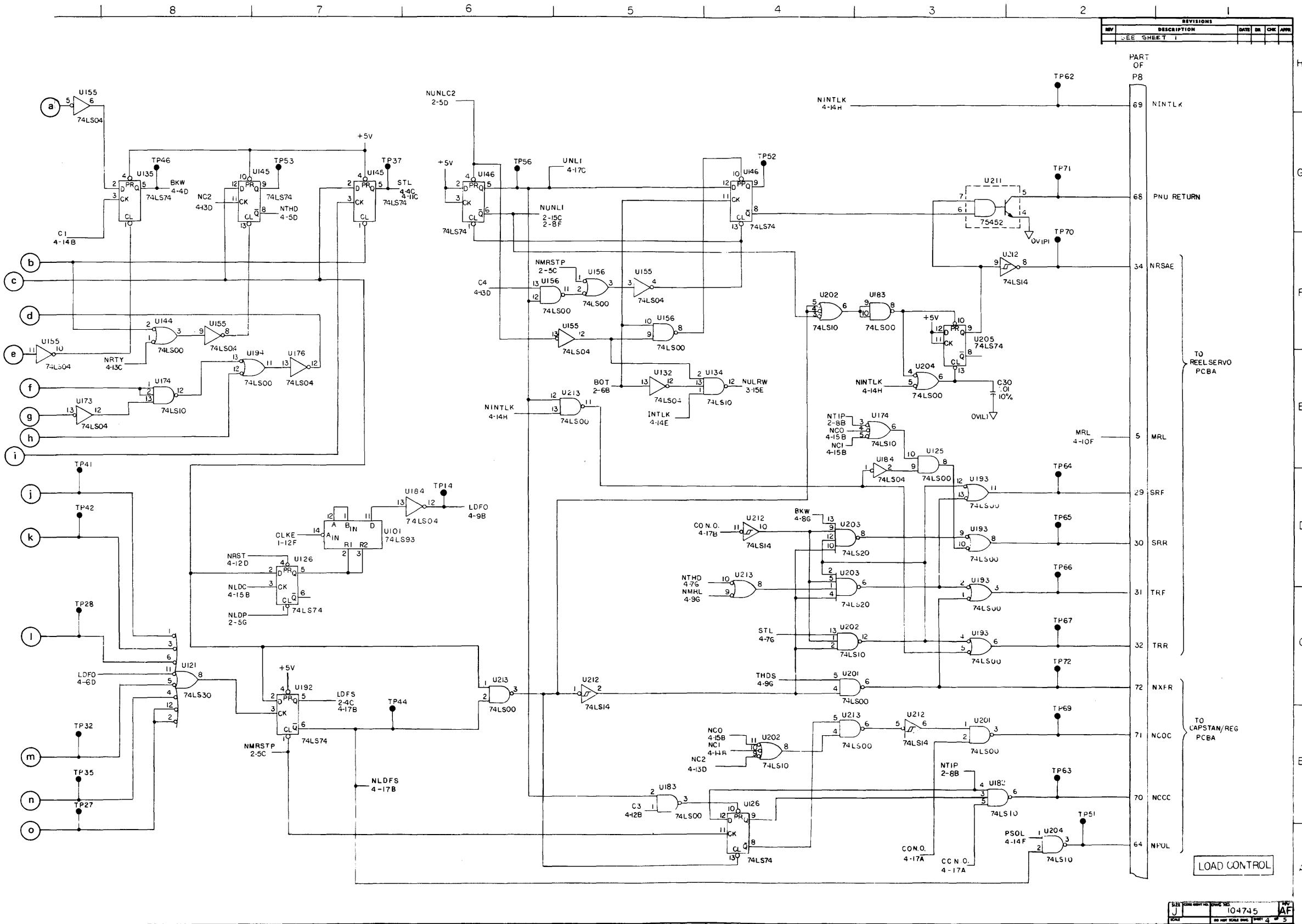
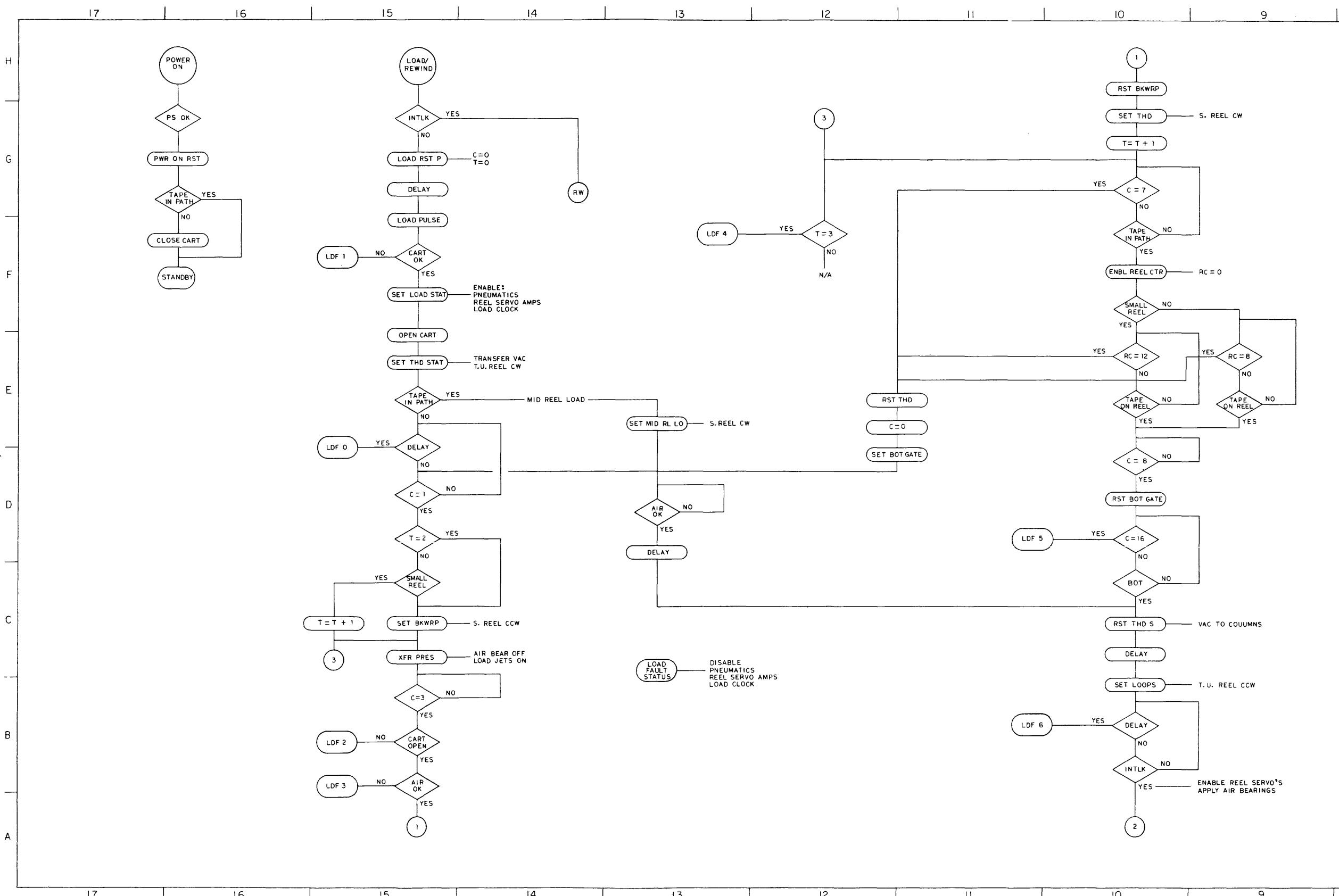


Figure 16 Schematic, Control M (Sheet 8 of 10)



MA-5813

Figure 16 Schematic, Control M (Sheet 9 of 10)

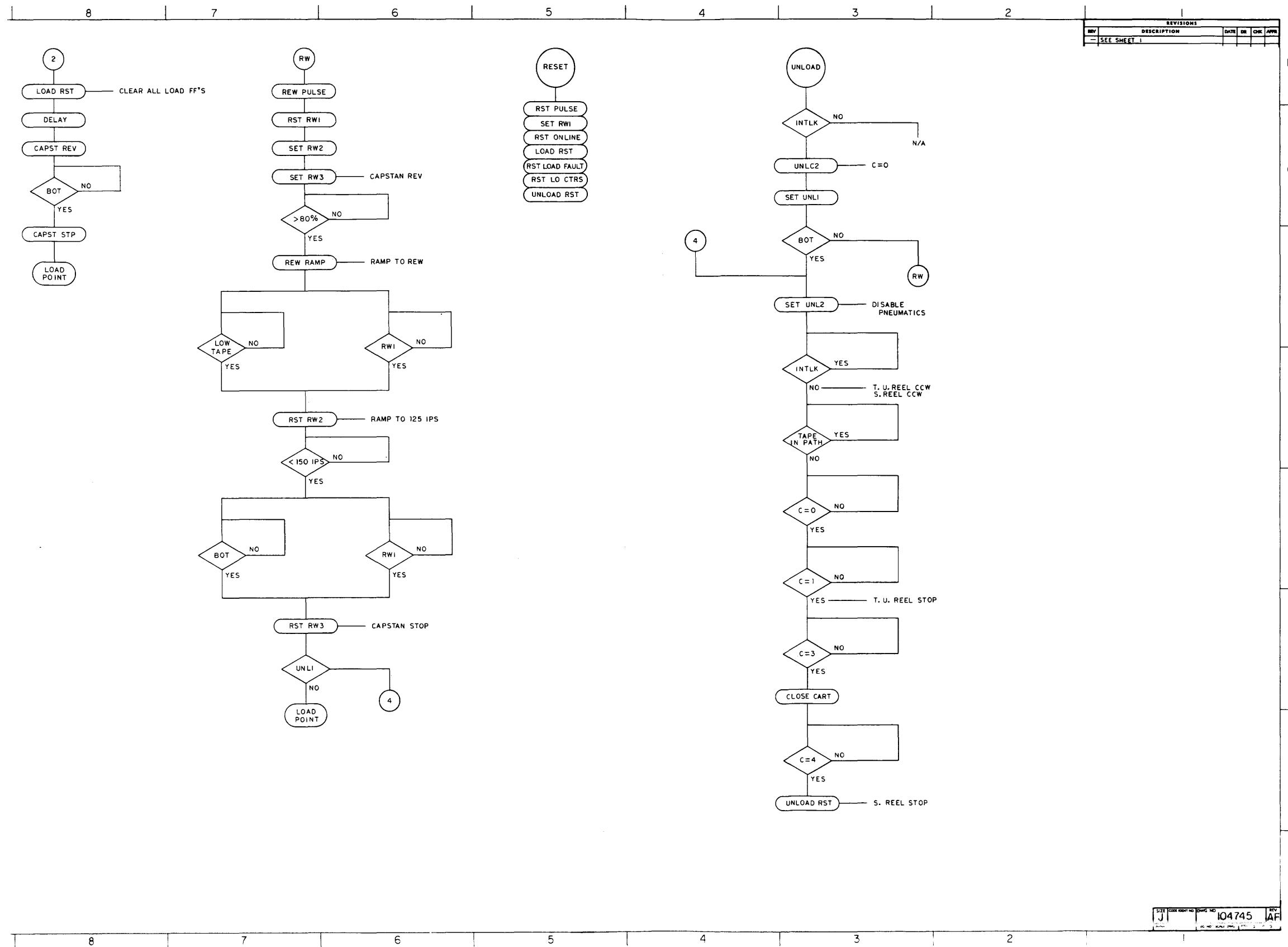


Figure 16 Schematic, Control M (Sheet 10 of 10)

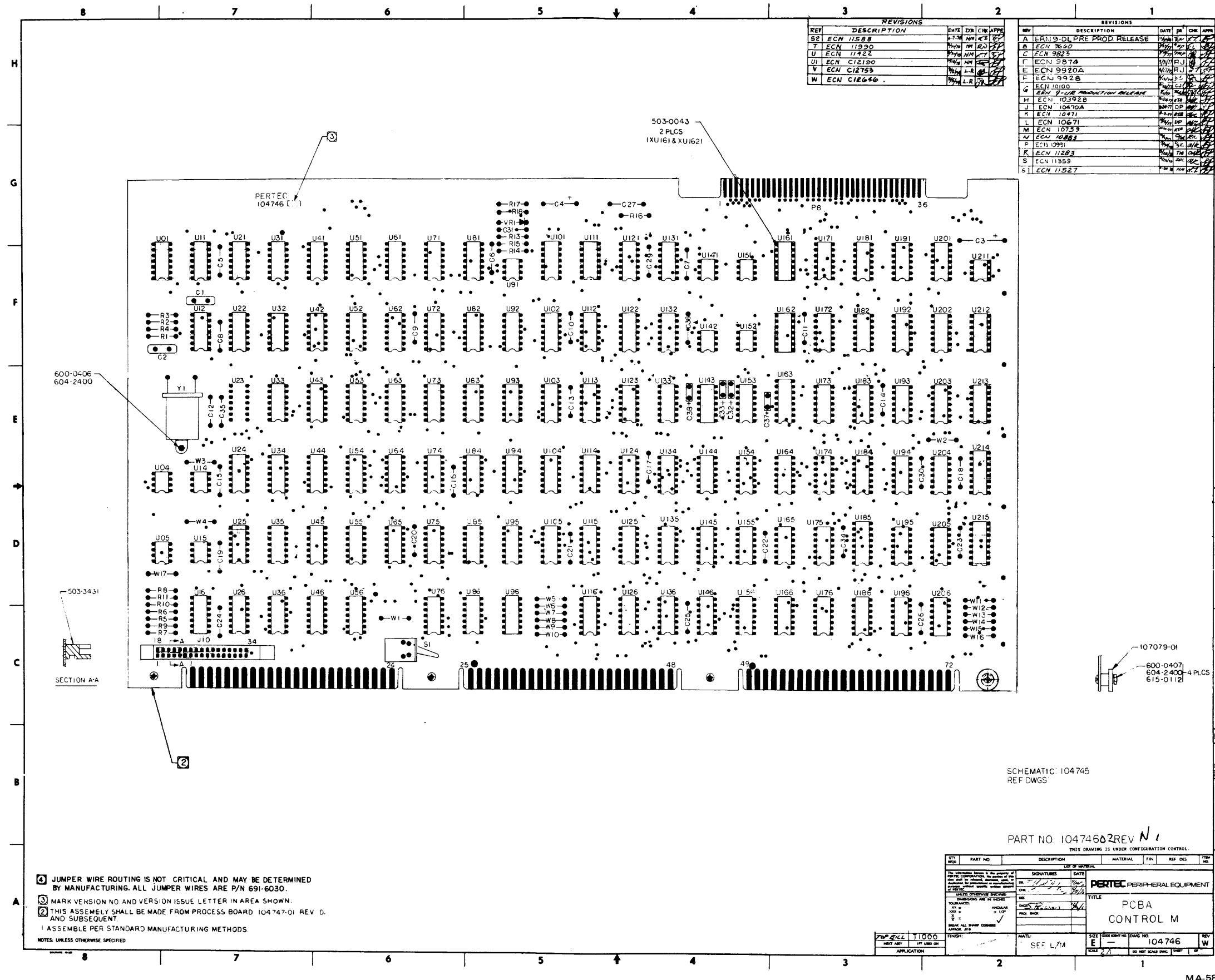


Figure 17 PCBA, Control M

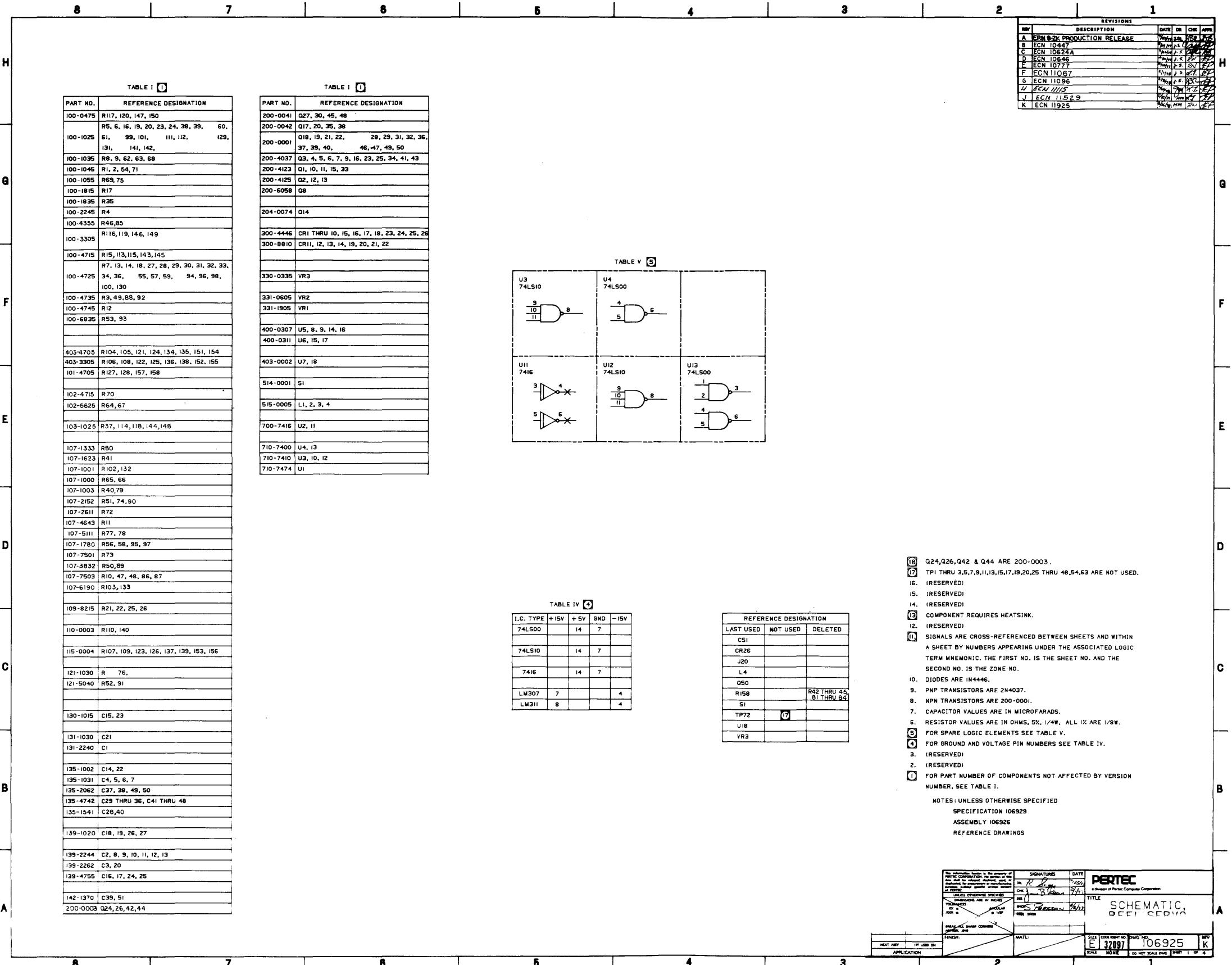


TABLE IV (4)				
I.C. TYPE	+15V	+5V	GND	-15V
74LS00	I4	7		
74LS10	I4	7		
7416	I4	7		
LM307	7		4	
LM311	8		4	

REFERENCE DESIGNATION		
LAST USED	NOT USED	DELETED
C51		
CR26		
J20		
L4		
Q50		
R15B	R42 THRU 45, 81 THRU 84	
S1		
TP72	(7)	
U18		
VR3		

- (6) Q24, Q26, Q42 & Q44 ARE 200-0003.
- (7) TPI THRU 3, 5, 7, 9, 11, 13, 15, 17, 19, 20, 25 THRU 48, 54, 63 ARE NOT USED.
- 16. (RESERVED)
- 15. (RESERVED)
- 14. (RESERVED)
- (13) COMPONENT REQUIRES HEATSINK.
- (12) (RESERVED)
- (11) SIGNALS ARE CROSS-REFERENCED BETWEEN SHEETS AND WITHIN
A SHEET BY NUMBERS APPEARING UNDER THE ASSOCIATED LOGIC
TERM MNEMONIC. THE FIRST NO. IS THE SHEET NO. AND THE
SECOND NO. IS THE ZONE NO.
- 10. DIODES ARE IN4446.
- 9. PNP TRANSISTORS ARE 2N4037.
- 8. NPN TRANSISTORS ARE 2N0-0001.
- 7. CAPACITOR VALUES ARE IN MICROFARADS.
- 6. RESISTOR VALUES ARE IN OHMS, %, 1/4W, ALL IX ARE 1/8W.
- (5) FOR SPARE LOGIC ELEMENTS SEE TABLE V.
- (4) FOR GROUND AND VOLTAGE PIN NUMBERS SEE TABLE IV.
- 3. (RESERVED)
- 2. (RESERVED)
- (1) FOR PART NUMBER OF COMPONENTS NOT AFFECTED BY VERSION
NUMBER, SEE TABLE I.

NOTES: UNLESS OTHERWISE SPECIFIED
SPECIFICATION 106929
ASSEMBLY 106926
REFERENCE DRAWINGS

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TITLE: SCHEMATIC REF ID: DEE1 SERV1	
FINISH:	MATL:
NEXT ACT:	1ST USE ON:
APPLICAION:	
SIZE: CODE: E 32897	PRINT: 106925
SCALE: 1:1	REV: K
DO NOT SCALE DRAFTING SHEET 1 OF 4	

MA-5816

Figure 18 Schematic, Reel Servo (Sheet 1 of 4)

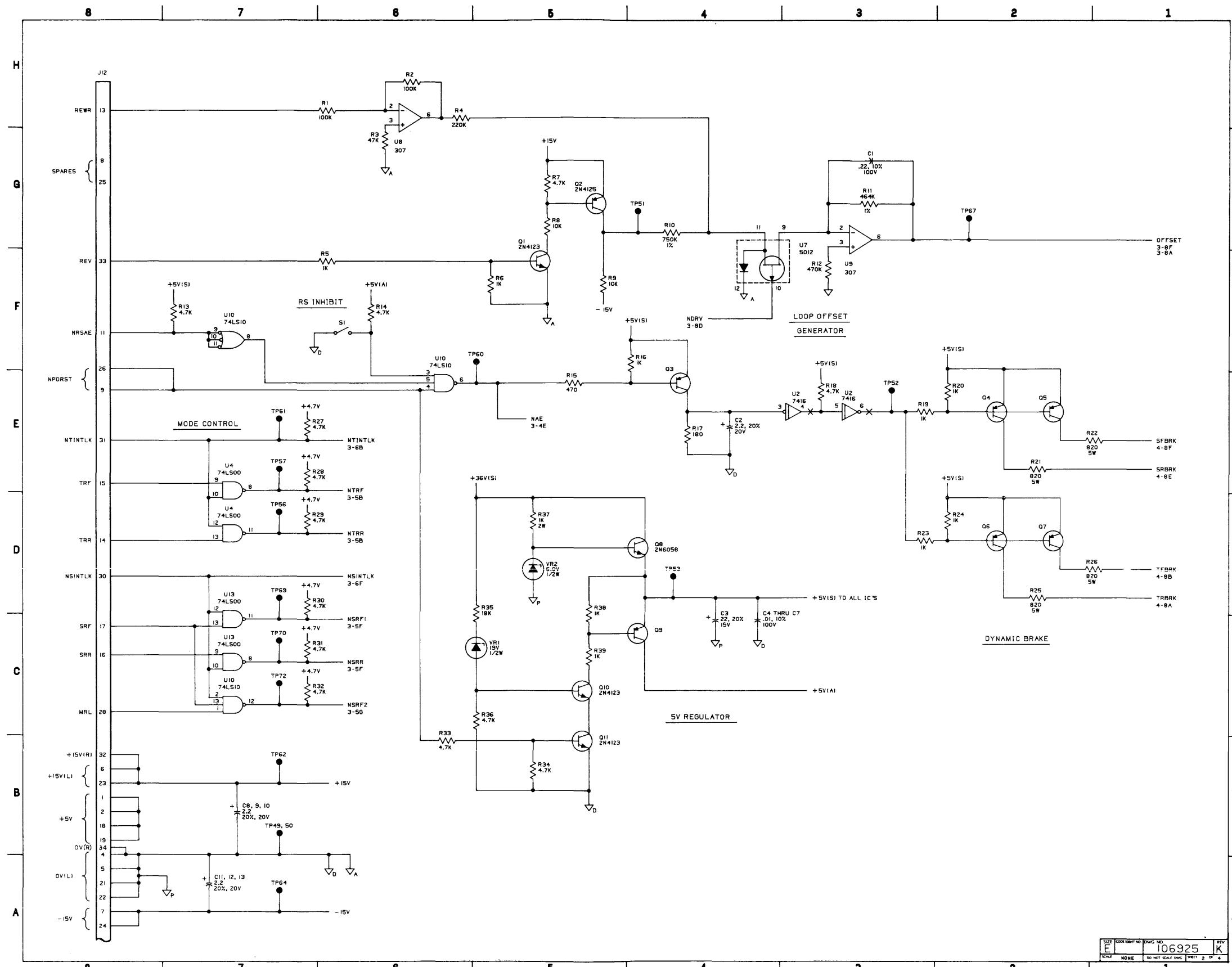


Figure 18 Schematic, Reel Servo (Sheet 2 of 4)

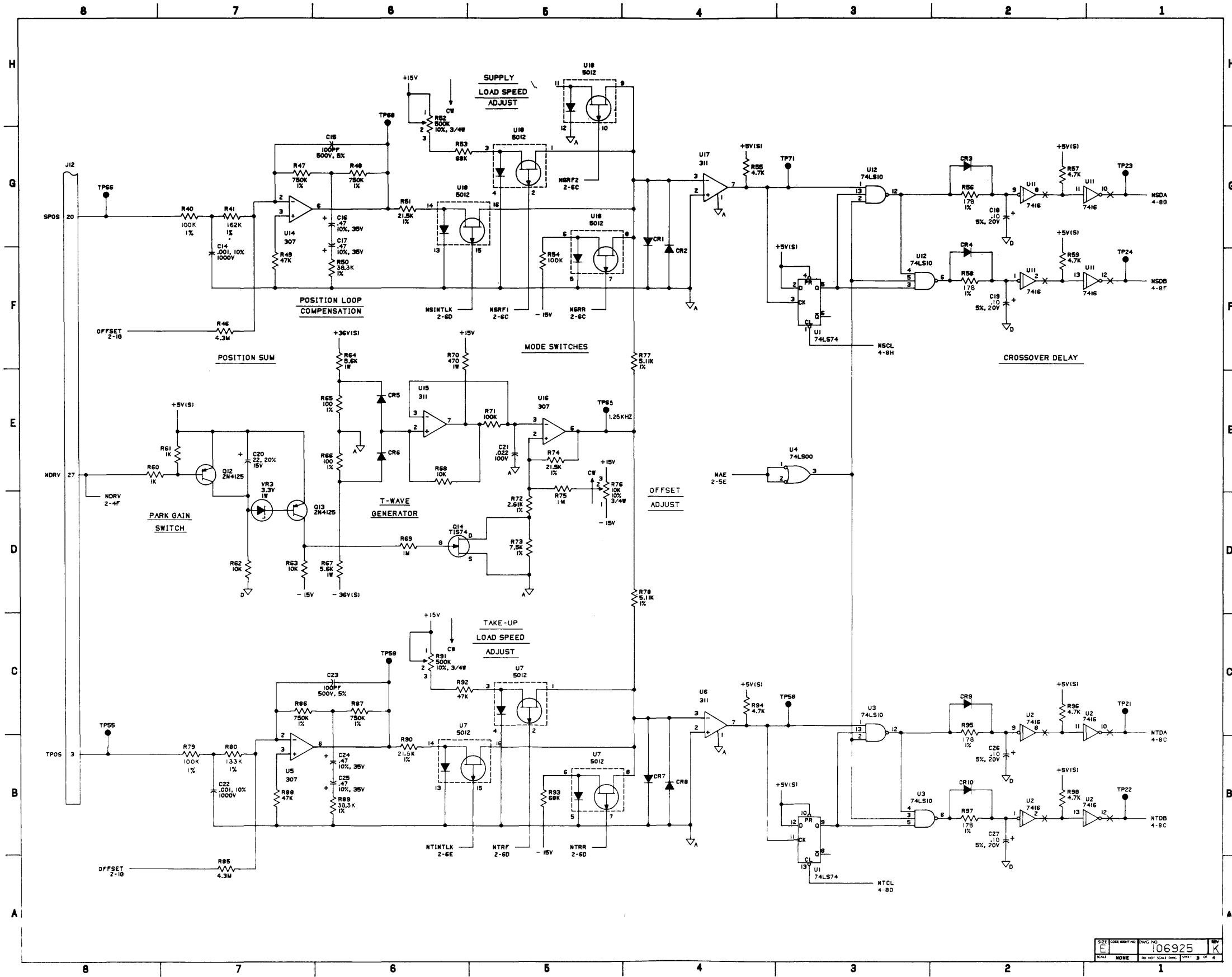


Figure 18 Schematic, Reel Servo (Sheet 3 of 4)

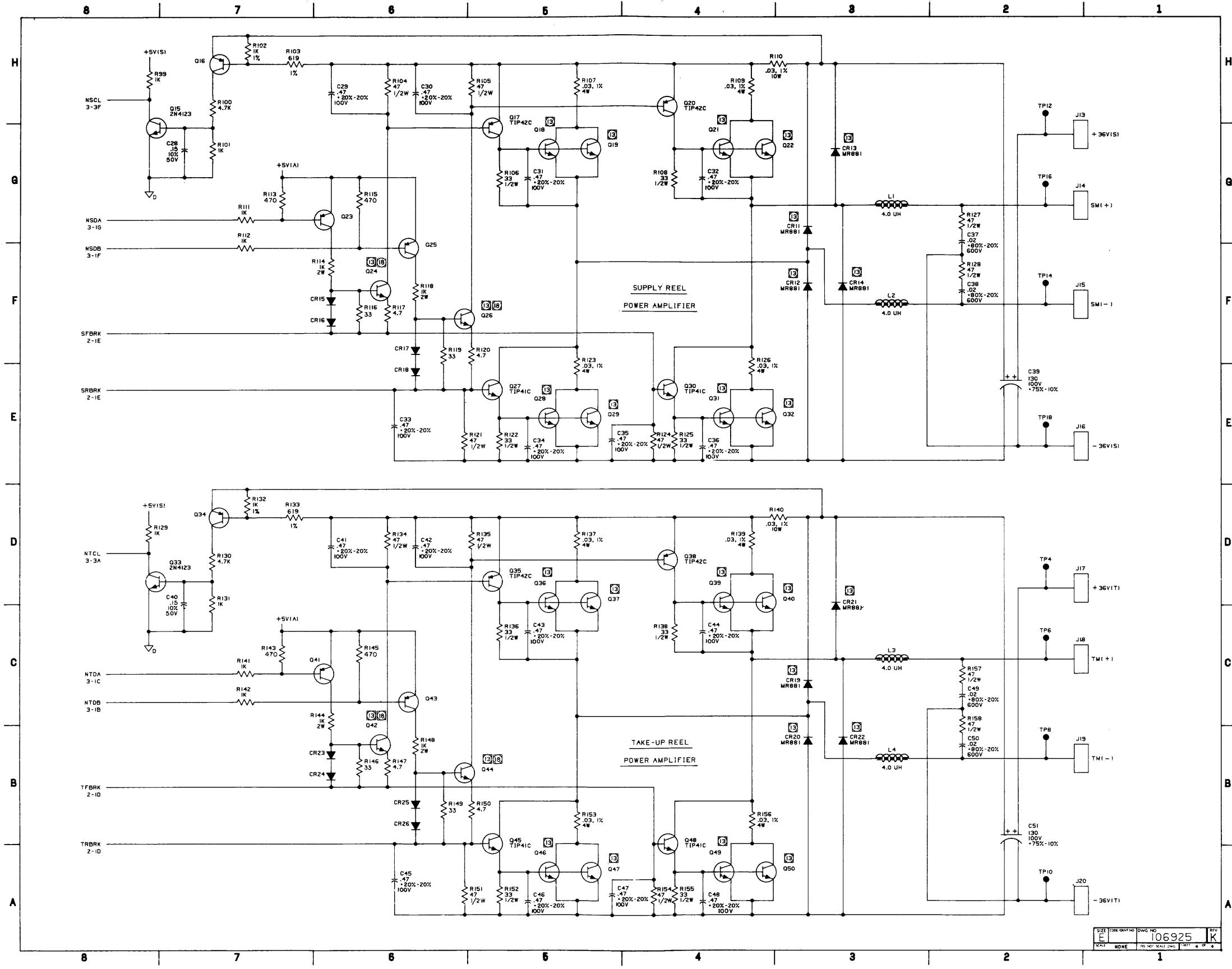


Figure 18 Schematic, Reel Servo (Sheet 4 of 4)

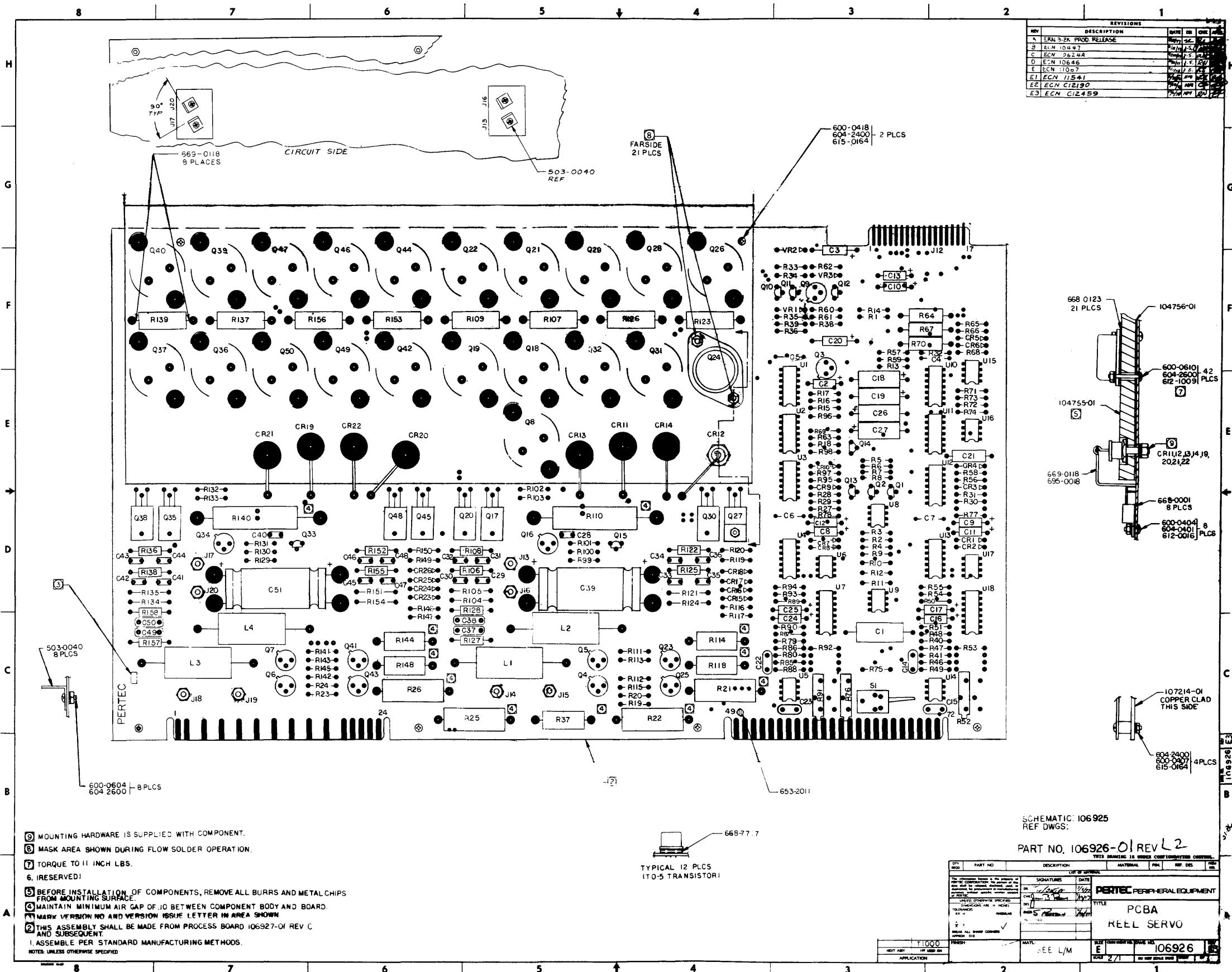


Figure 19 PCBA, Reel Servo

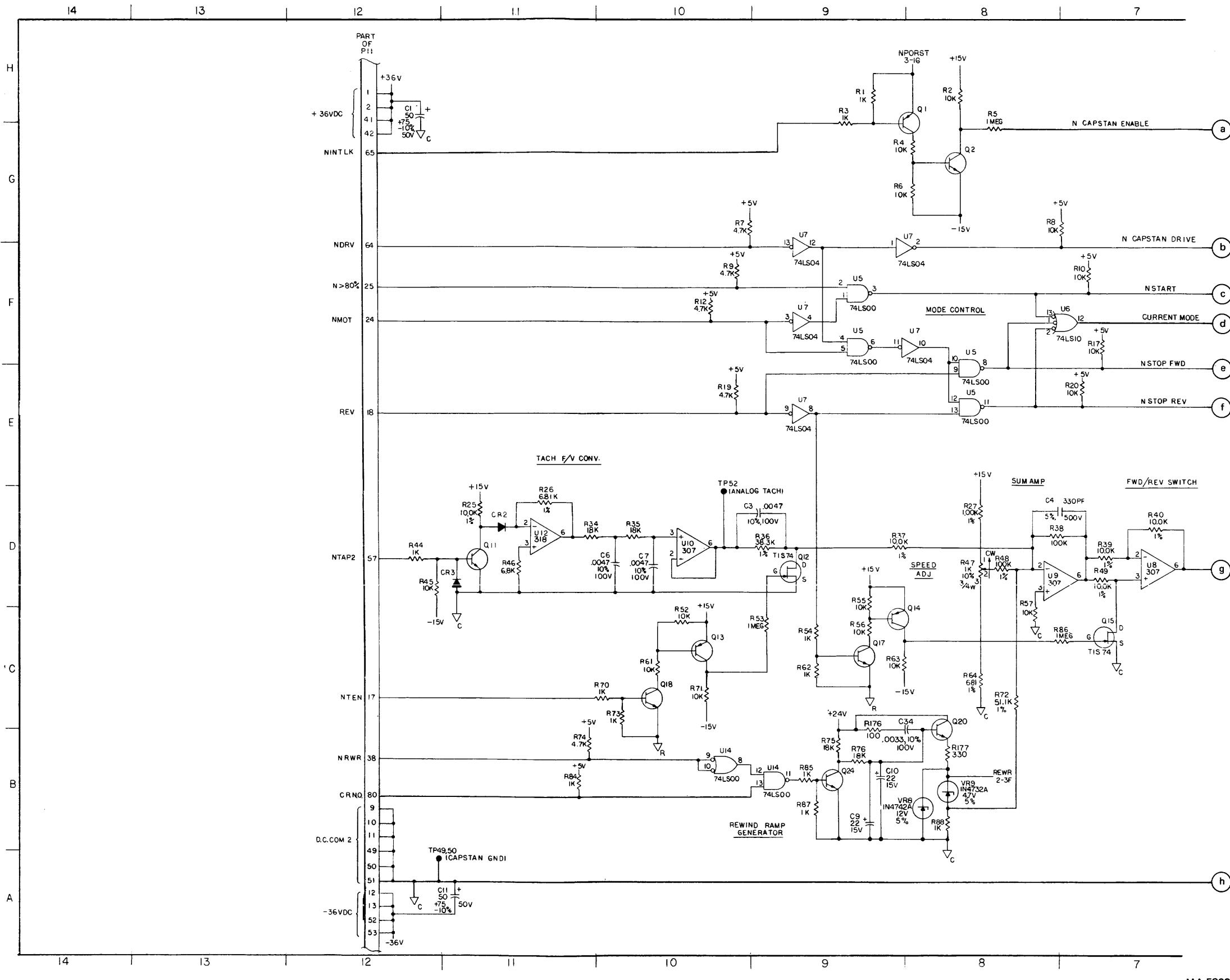


Figure 20 Schematic, Capstan/Regulator (Sheet 2 of 4)

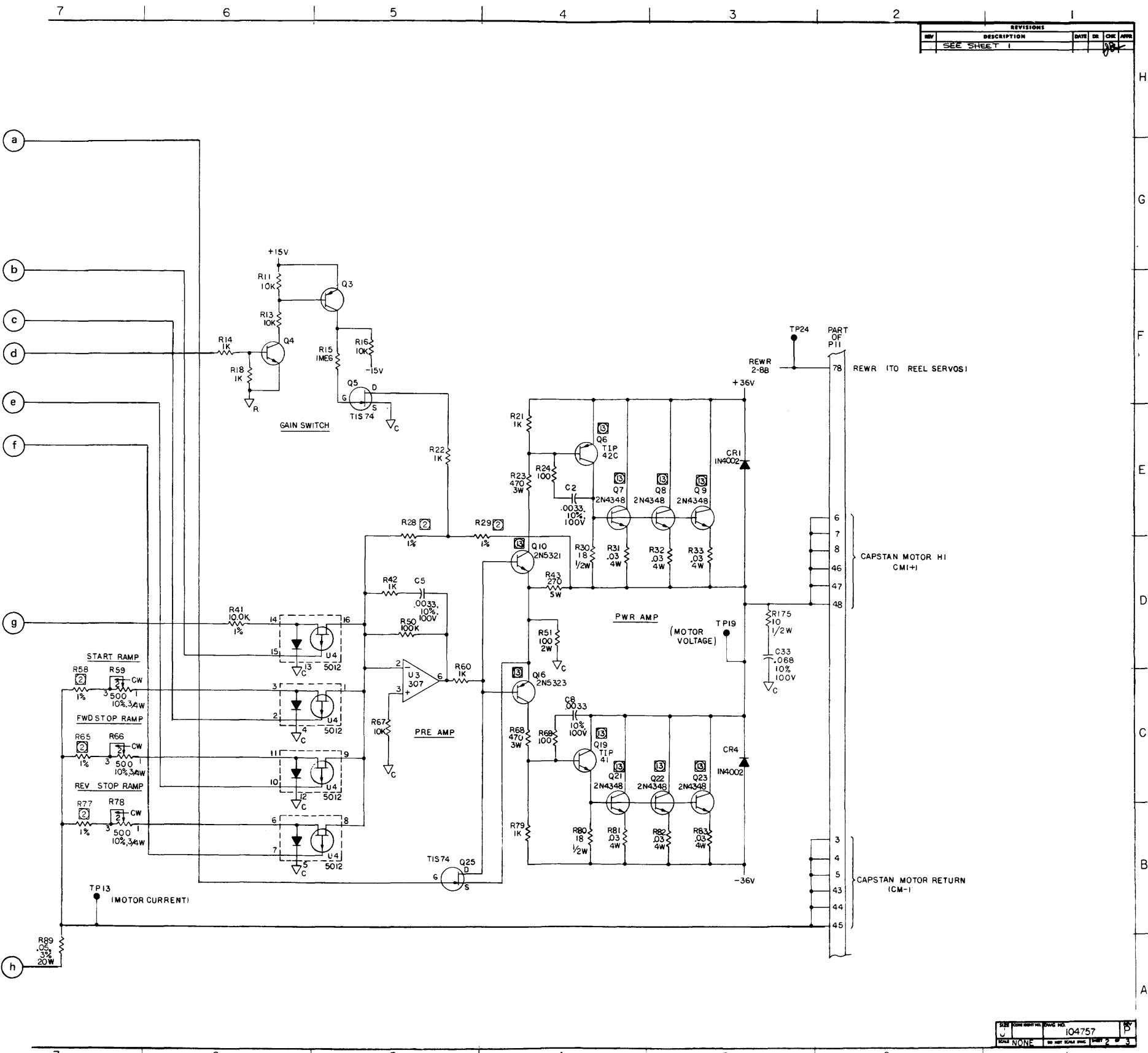


Figure 20 Schematic, Capstan/Regulator (Sheet 3 of 4)

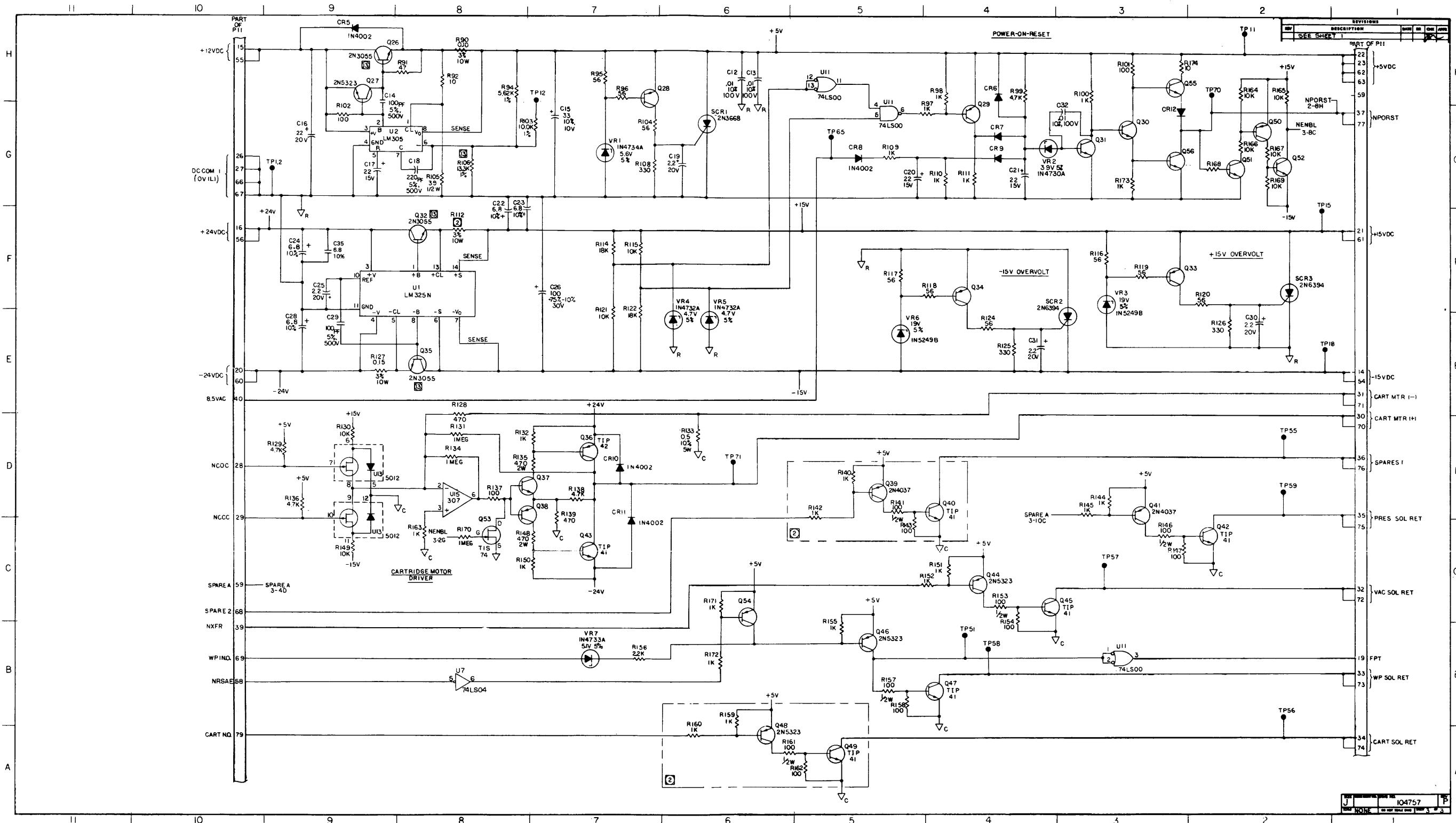
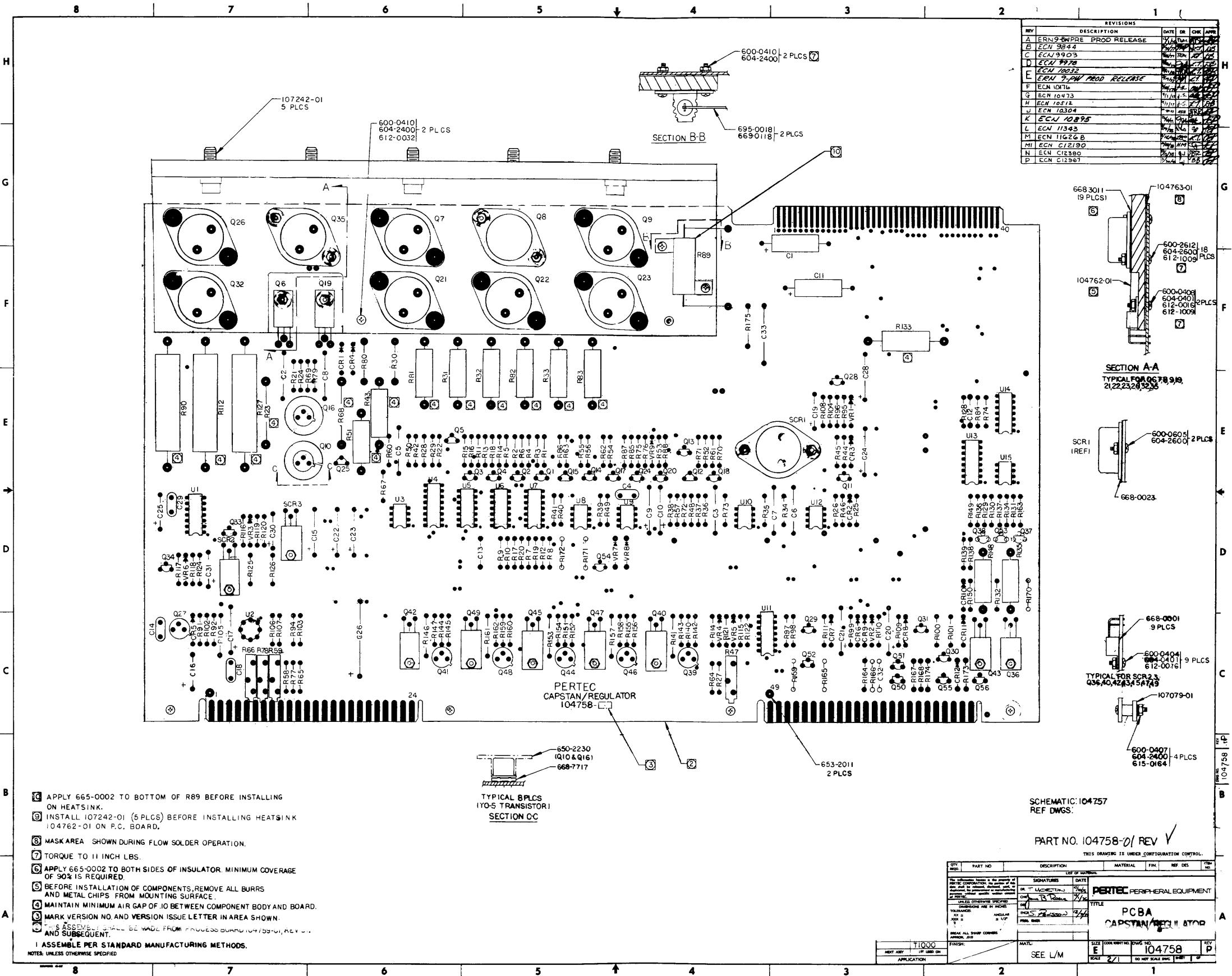


Figure 20 Schematic, Capstan/Regulator (Sheet 4 of 4)



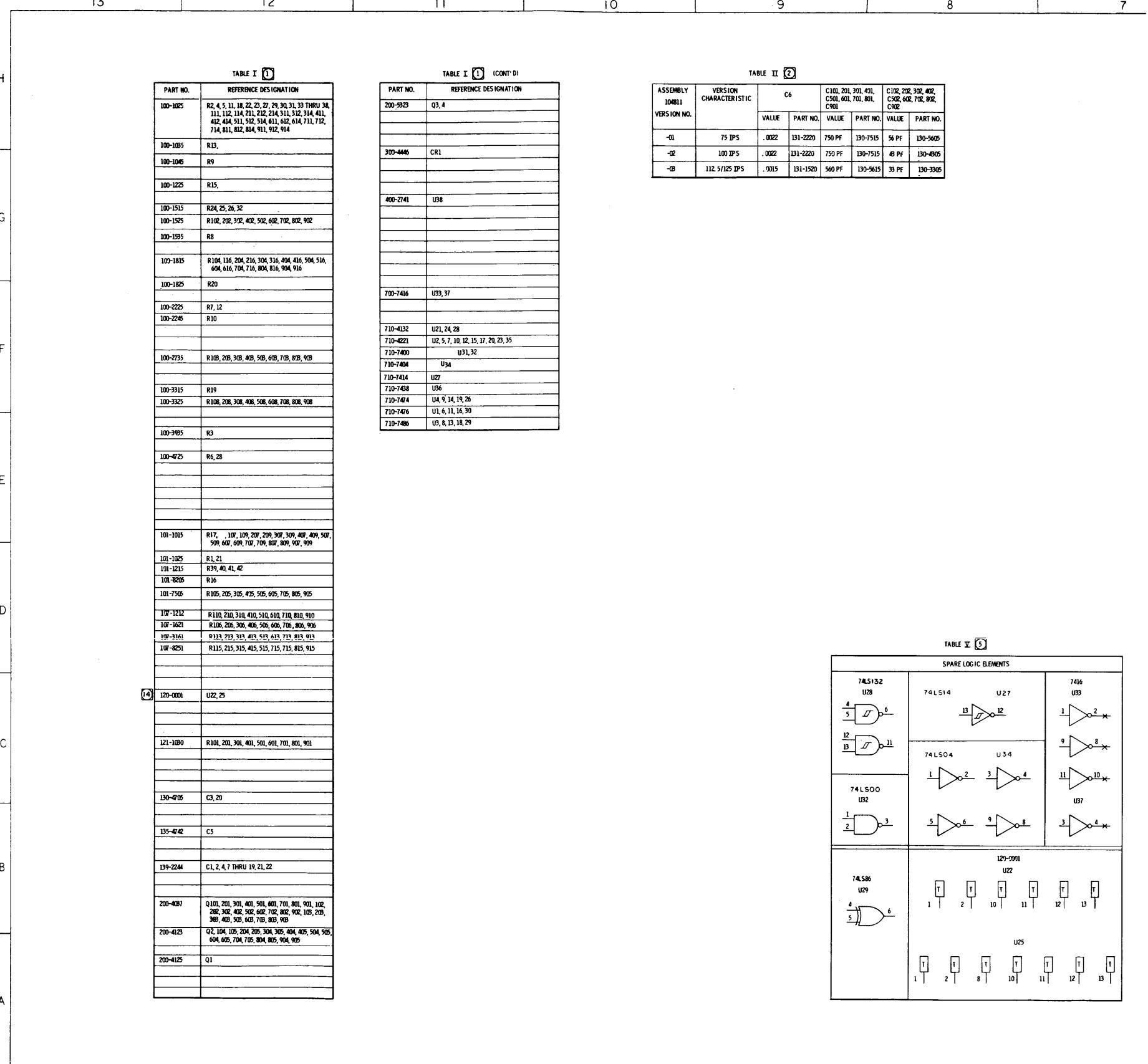


Figure 22 Schematic, Write (Sheet 1 of 4)

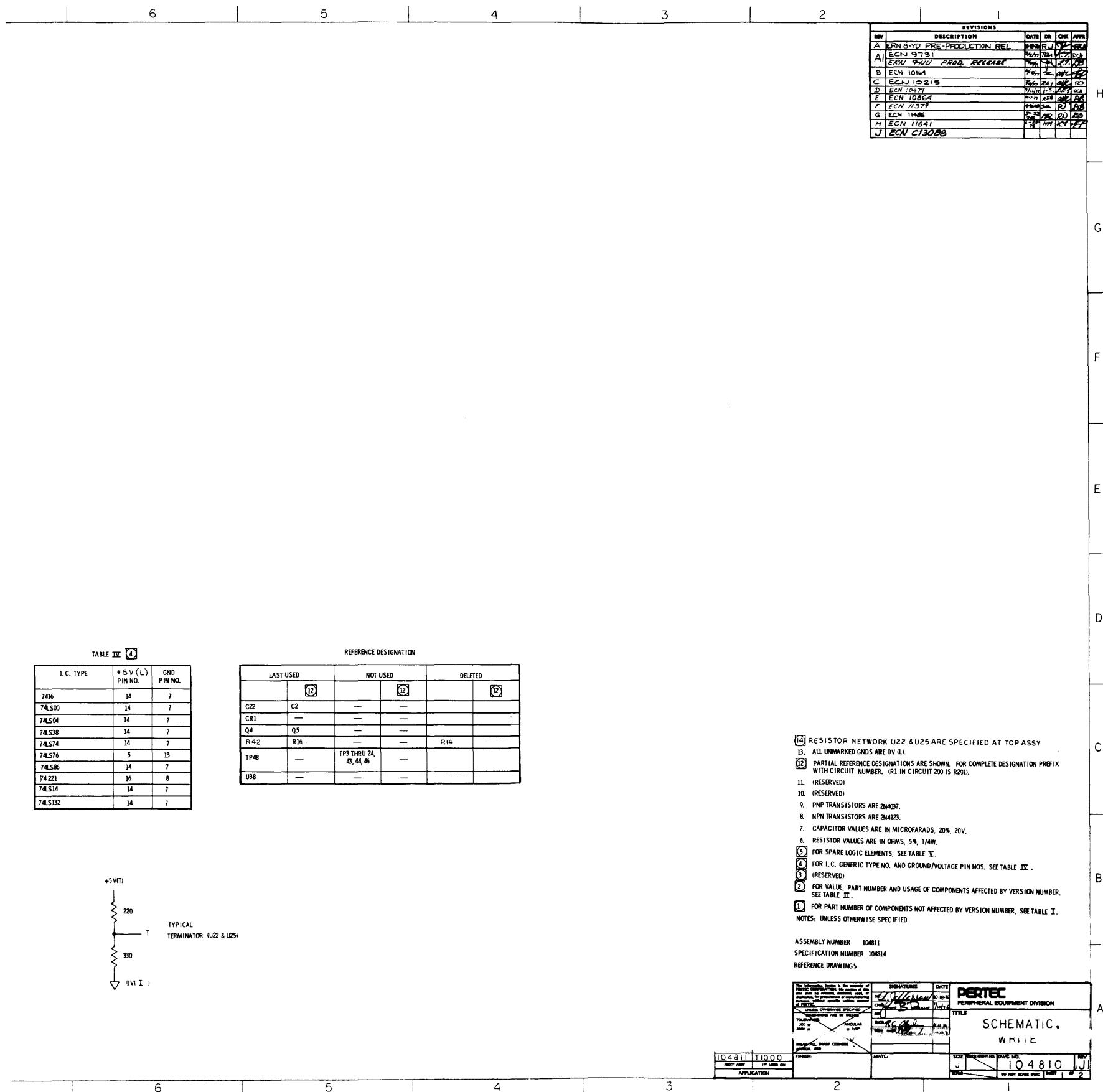


Figure 22 Schematic, Write (Sheet 2 of 4)

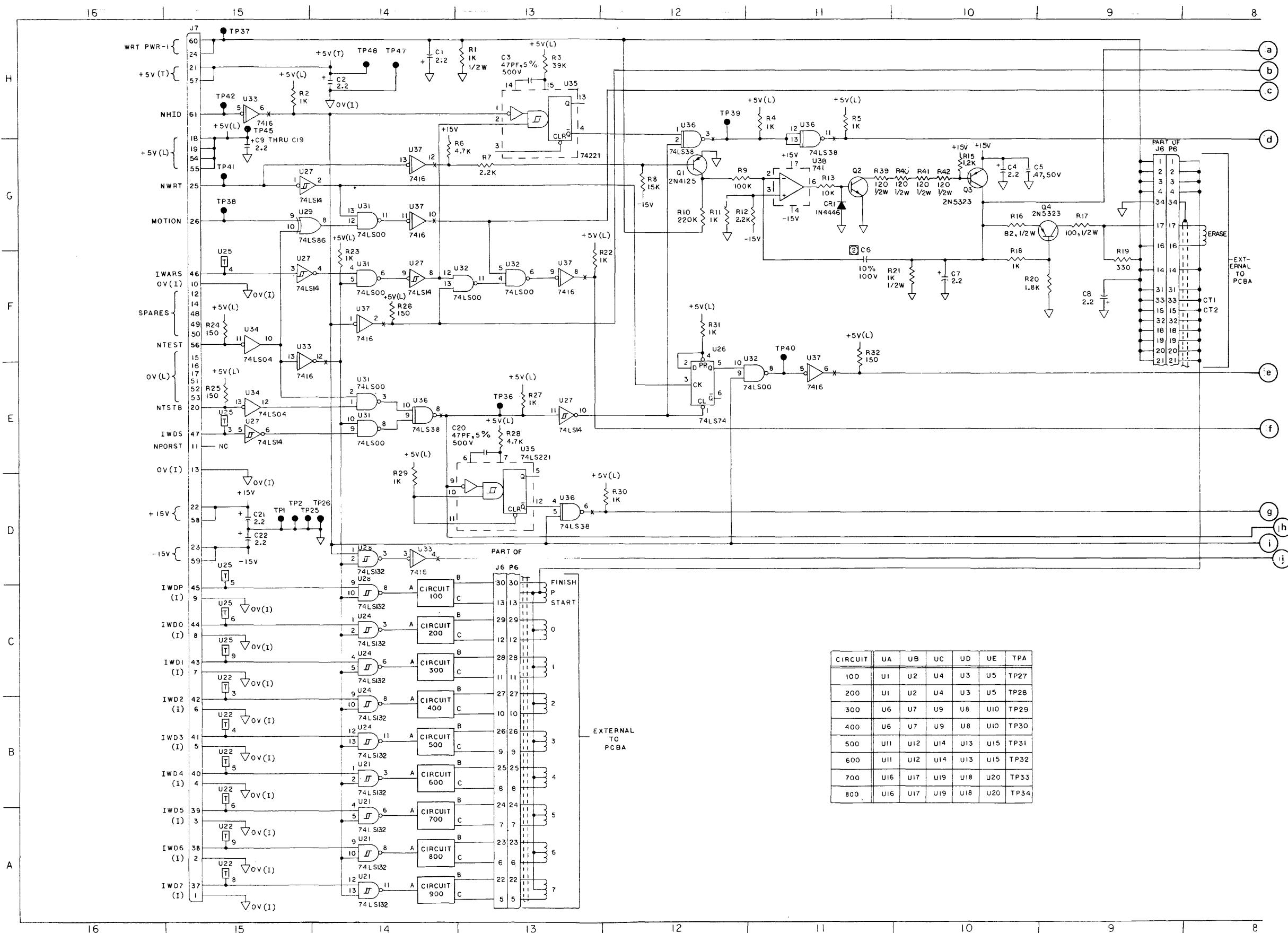


Figure 22 Schematic, Write (Sheet 3 of 4)

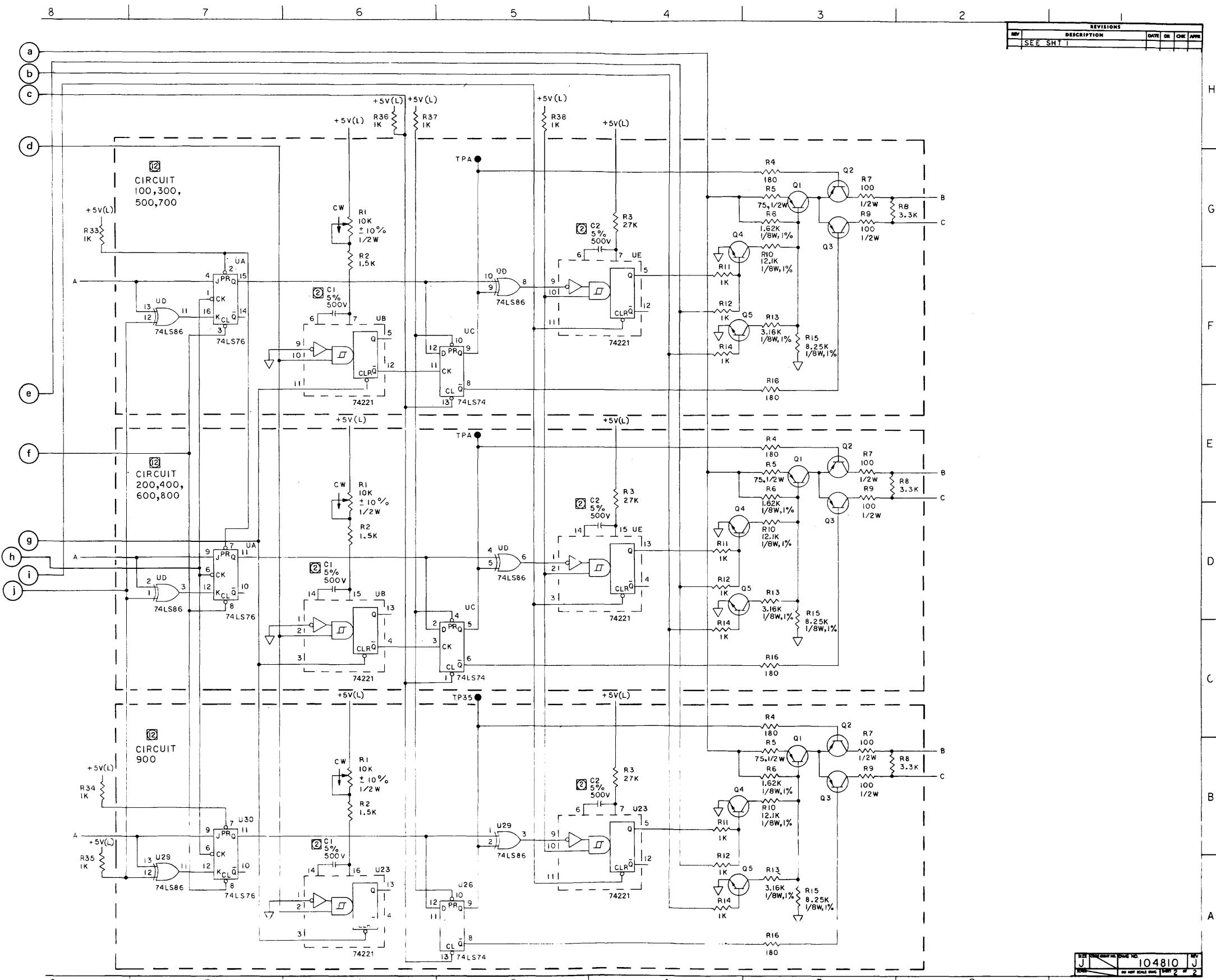


Figure 22 Schematic, Write (Sheet 4 of 4)

1 MA-5829

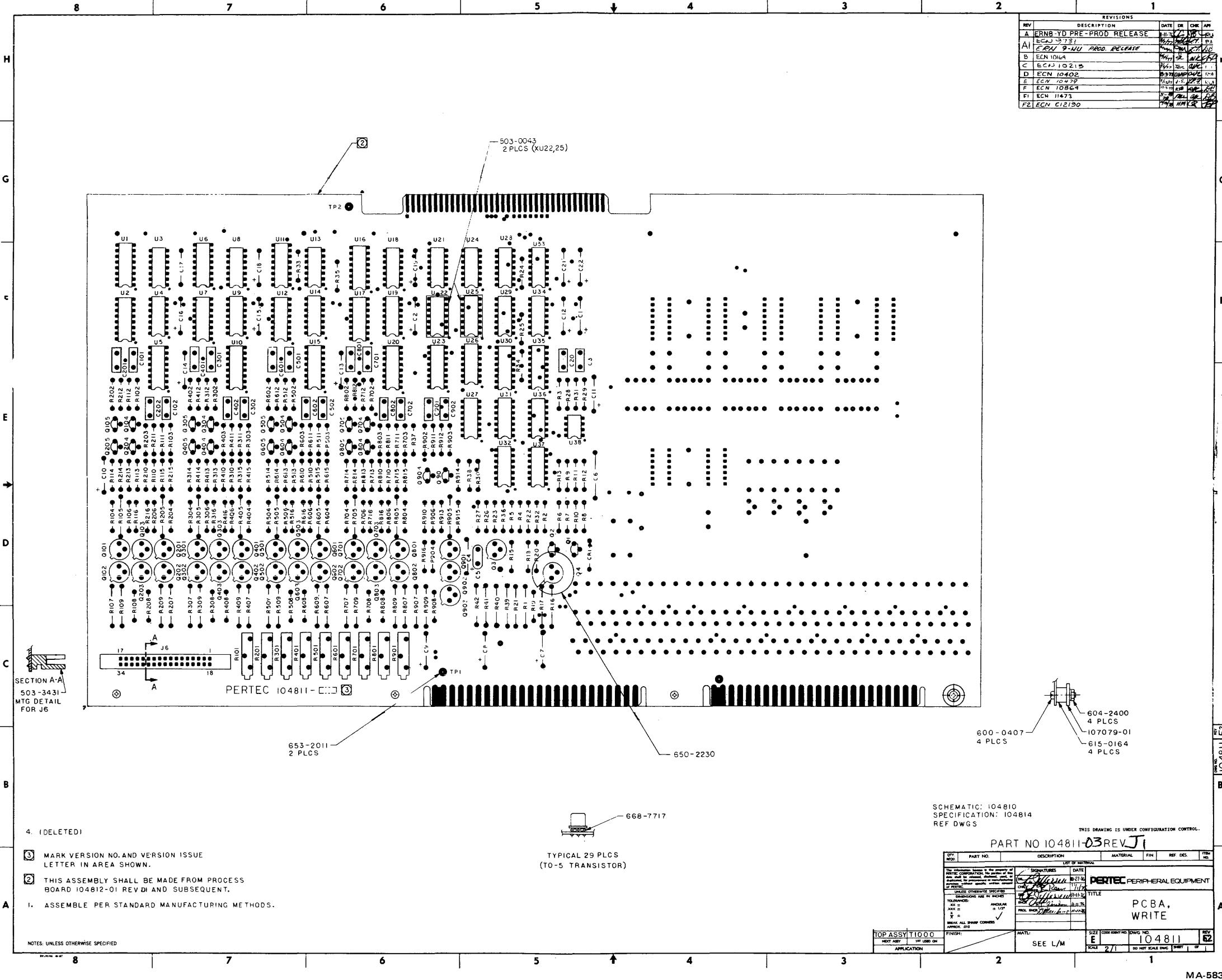


Figure 23 PCBA, Write

1 TABLE I		2 TABLE II (CONT'D)		3 TABLE III	
PART NO.	REFERENCE DESIGNATION	PART NO.	REFERENCE DESIGNATION	PART NO.	REFERENCE DESIGNATION
100-1015	R136, 179, 236, 239, 306, 308, 406, 409, 506, 509, 606, R609, 106, 709, 806, 809, 906, 909	200-4123	Q4, 10, 11	100-1035	R40, 44
100-1025	R4, 13, 30, 39, 34, 47, 49, 53, 63, 70, 107, 217, 307, R47, 50, 69, 70, 80, 90, 7, 3	200-4125	Q1, 2, 3, 5, 6, 9	100-2225	R39, 43
100-1035	R1, 2, 15, 16, 36, 66	204-0074	Q101, 201, 301, 401, 501, 601, 701, 801, 901	107-3162	R42
100-1055	R32, 58, 68, 104, 110 THRU 121, 204, 318 THRU 221, R304, 218 THRU 321, 404, 418 THRU 421, 504, R518 THRU 521, 604, 518 THRU 621, 724 R718 THRU 721, 804, 318 THRU 821, 904, R918 THRU 921	300-4446	CR1, 2, 101 THRU 108, 201 THRU 208, 301 THRU 308, CR-401 THRU 408, 501 THRU 508, 601 THRU 608, CR-701 THRU 708, 801 THRU 808, 901 THRU 908	107-5112	R46
100-2205	R50, 54	400-3018	U101, 102, 201, 202, 301, 302, 401, 402, 501, 502, 601, U602, 701, 702, 801, 802, 901, 902	121-5350	R41, 45
100-2225	R35	400-3019	U41, 42, 103, 204, 303, 304, 403, 404, 503, U504, 603, 604, 703, 704, 803, 804, 903, 904	200-4125	Q7, 8
100-2235	R3	400-2741	U38, 39, 40	710-7426	U35
100-4745	R74	515-1015	L1 THRU 6		
100-3905	R55, 56, 57, 63, 67, 110 THRU 117, 210 THRU 217, R310 THRU 317, 410 THRU 417, 510 THRU 517, R610 THRU 617, 710 THRU 717, 810 THRU 819, R910 THRU 917	700-5452	U7, 8, 9, 18 THRU 26		
100-4715	R48, 51, 59, 69, 122, 123, 222, 223, 322, 323, 422, 423, R522, 523, 622, 623, 722, 723, 822, 823, 922, 923	700-7416	U17, 34		
100-4725	R14, 61	710-4123	U105, 205, 305, 405, 505, 605, 705, 805,		
107-0100	R72	710-7400	U29, 30		
107-0196	R75	710-7404	U27, 28		
107-4548	R10, 28	710-7410	U33		
107-4511	R9, 27	710-7427	U1, 3, 6, 31		
107-1002	R19, 20, 22, 108, 208, 308, 408, 508, 608, 708, 808, R908, 17	710-7430	U32		
107-1101	R7	710-7438	U36, 37		
107-1212	R108, 105, 205, 305, 303, 403, 405, 503, 505, 503, R605, 705, 703, 805, 903, 905	710-7474	U10, 11, 13, 15, 16		
107-1330	R8, 26	710-7486	U2, 4, 5		
107-1622	R38	104-1471	R76		
107-2151	R64, 65	107-1621	R25		
107-2371	R62	104-2610	R71		
107-2800	R5	107-9090	R24		
107-3830	R23				
107-4641	R12				
107-5111	R21				
107-5110	R101, 102, 201, 202, 301, 302, 401, 402, 501, 502, 601, R602, 701, 702, 801, 802, 901, 902				
107-3161	R18				
107-8250	R6				
120-0001	U12, 14				
121-1010	R11, 29				
121-1050	R37				
130-1515	C64				
130-2215	C65				
130-4705	C63, 66, 67, 107 THRU 110, 207 THRU 210, C307 THRU 310, 407 THRU 410, 507 THRU 510, C607 THRU 610, 707 THRU 710, 807 THRU 810, C907 THRU 910				
135-1031	C73				
135-4742	C48 THRU 58, 68, C31 THRU 34, C69 THRU 72				
139-4755	C59, 60, 61				
139-2244	C1 THRU 30, 35 THRU 46, 101, 102, 201, C202, 301, 302, 401, 402, 501, 502, 601, 602, 701, 702, C801, 802, 901, 902				

Figure 24 Schematic, DATA L (Sheet 1 of 4)

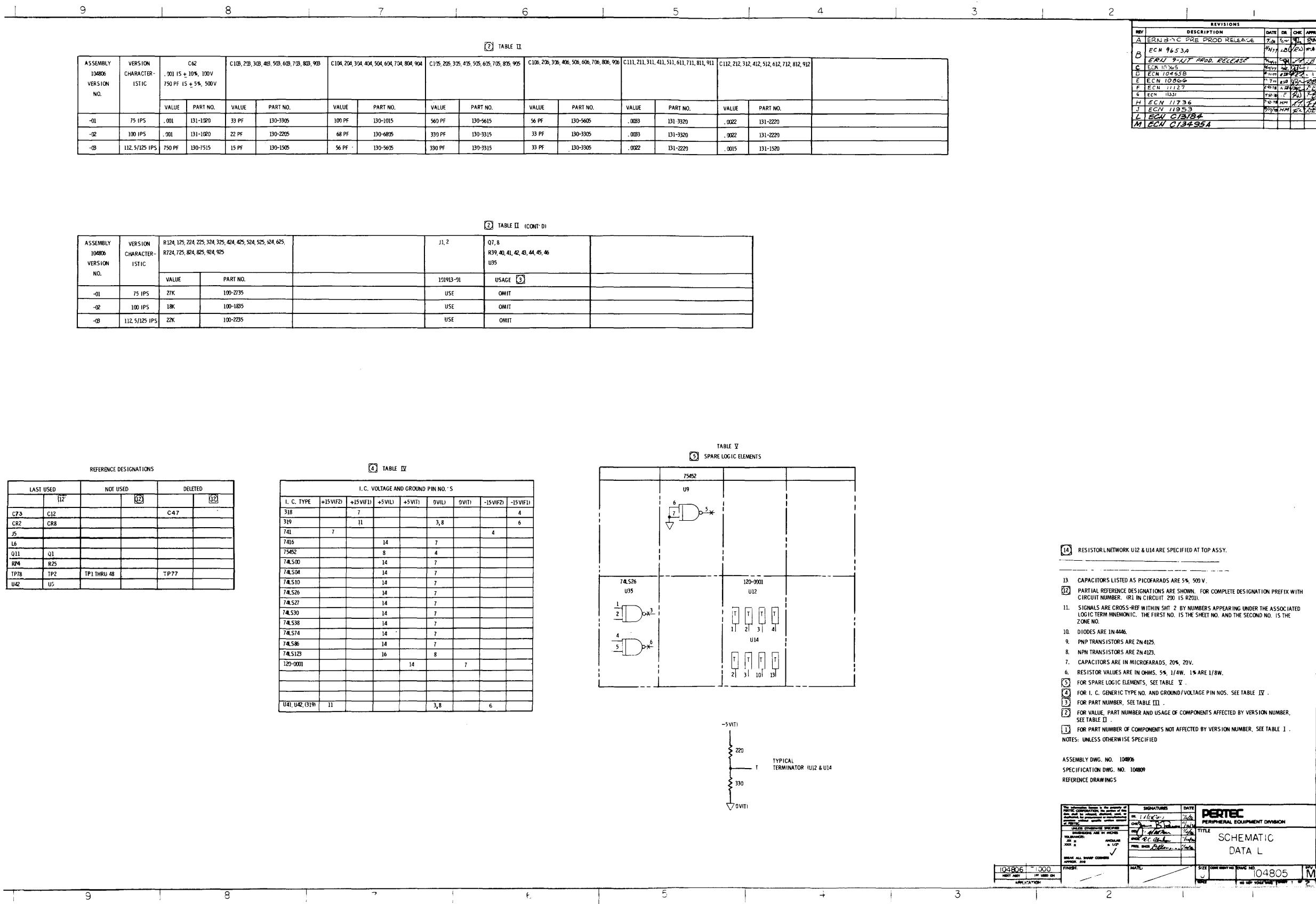
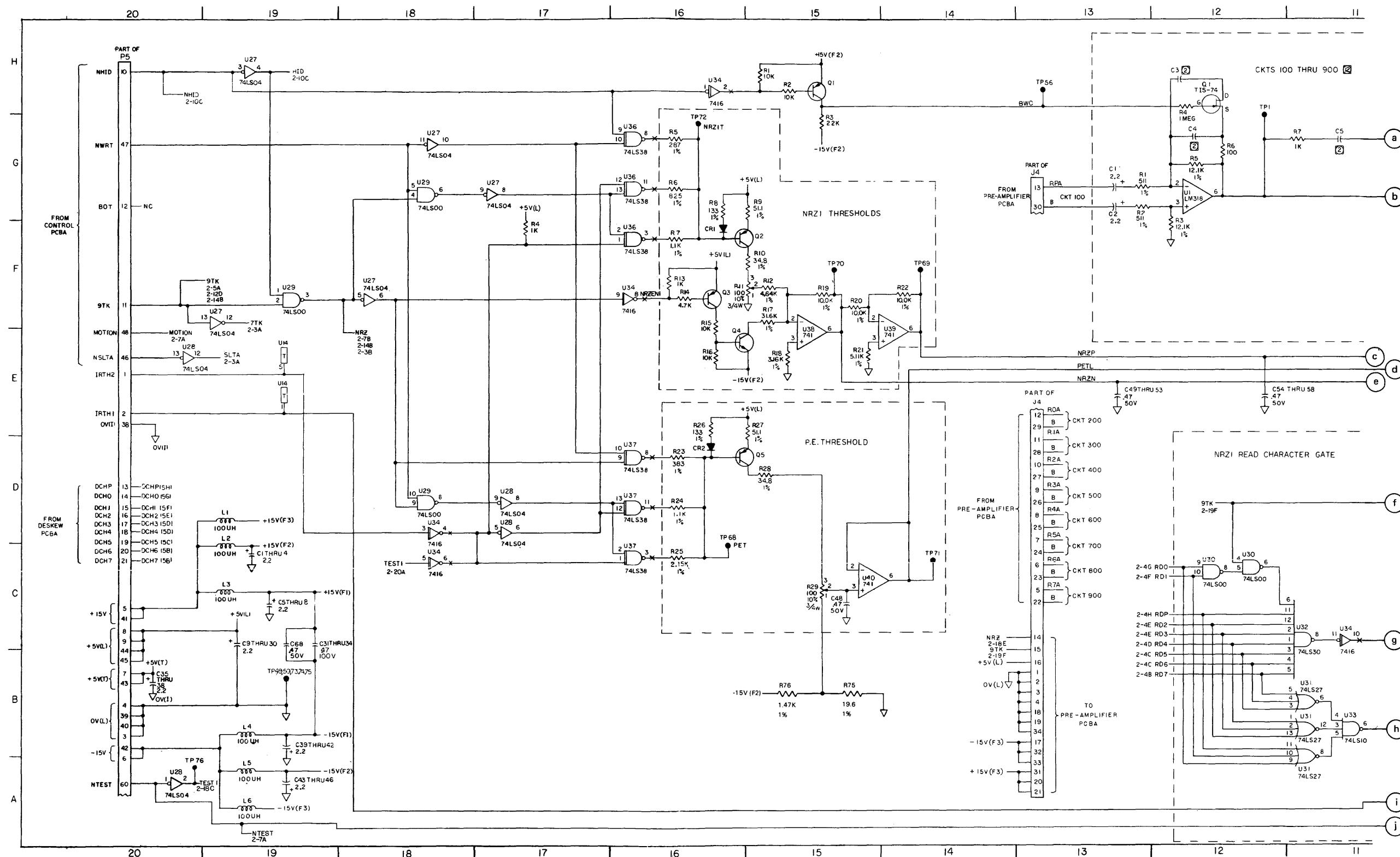


Figure 24 Schematic, DATA L (Sheet 2 of 4)



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Figure 24 Schematic, DATA L (Sheet 3 of 4)

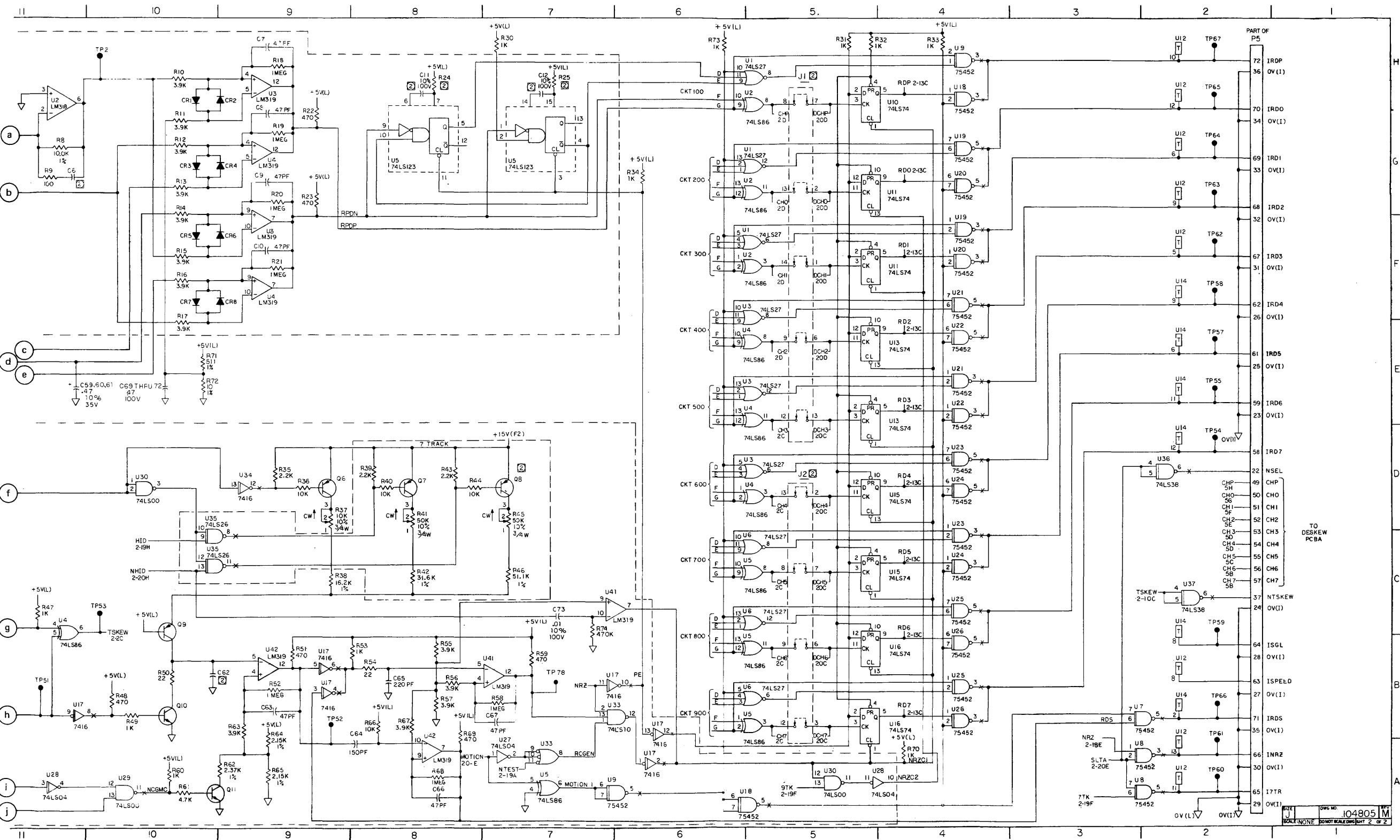


Figure 24 Schematic, DATA L (Sheet 4 of 4)

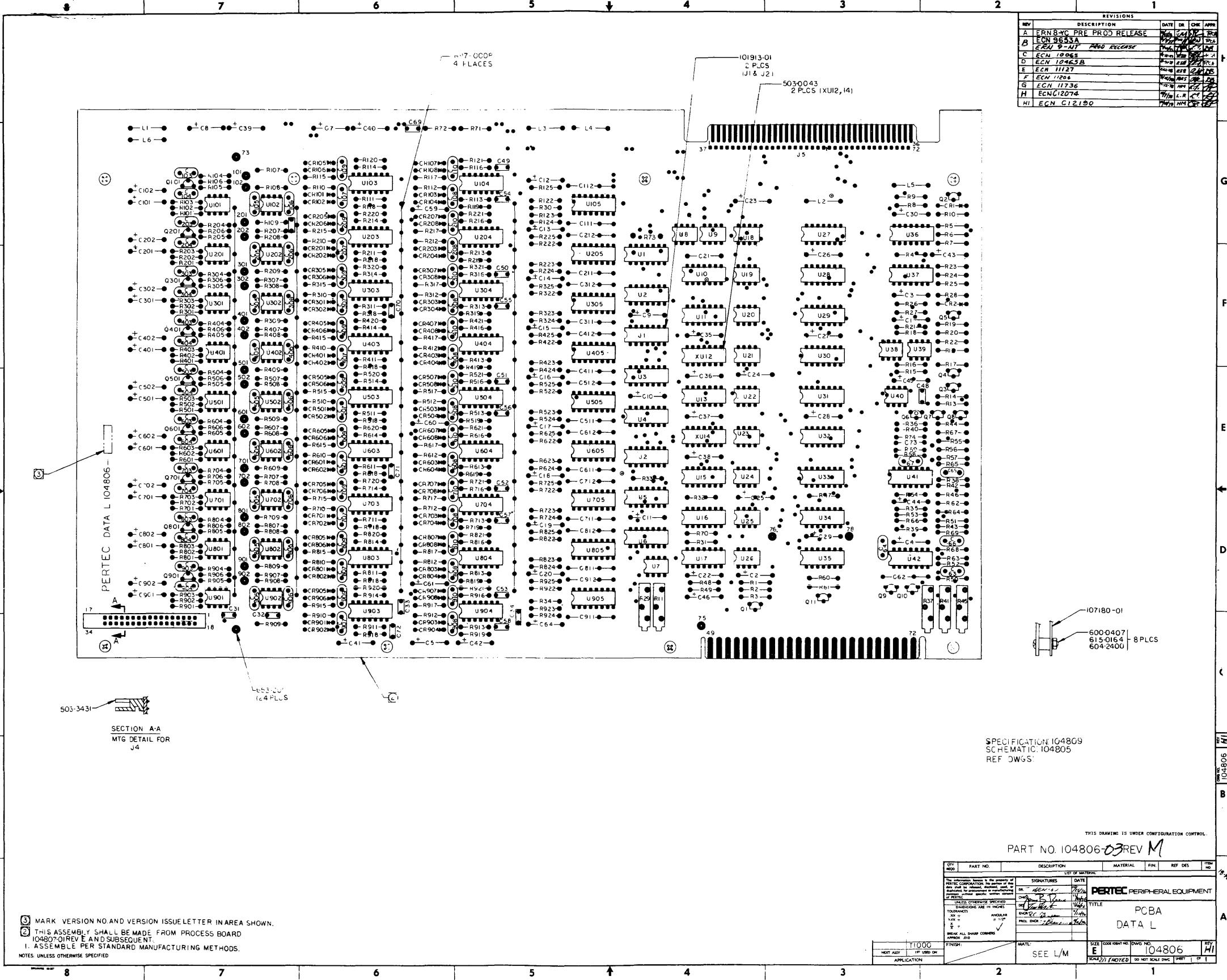


Figure 25 PCBA, DATA L

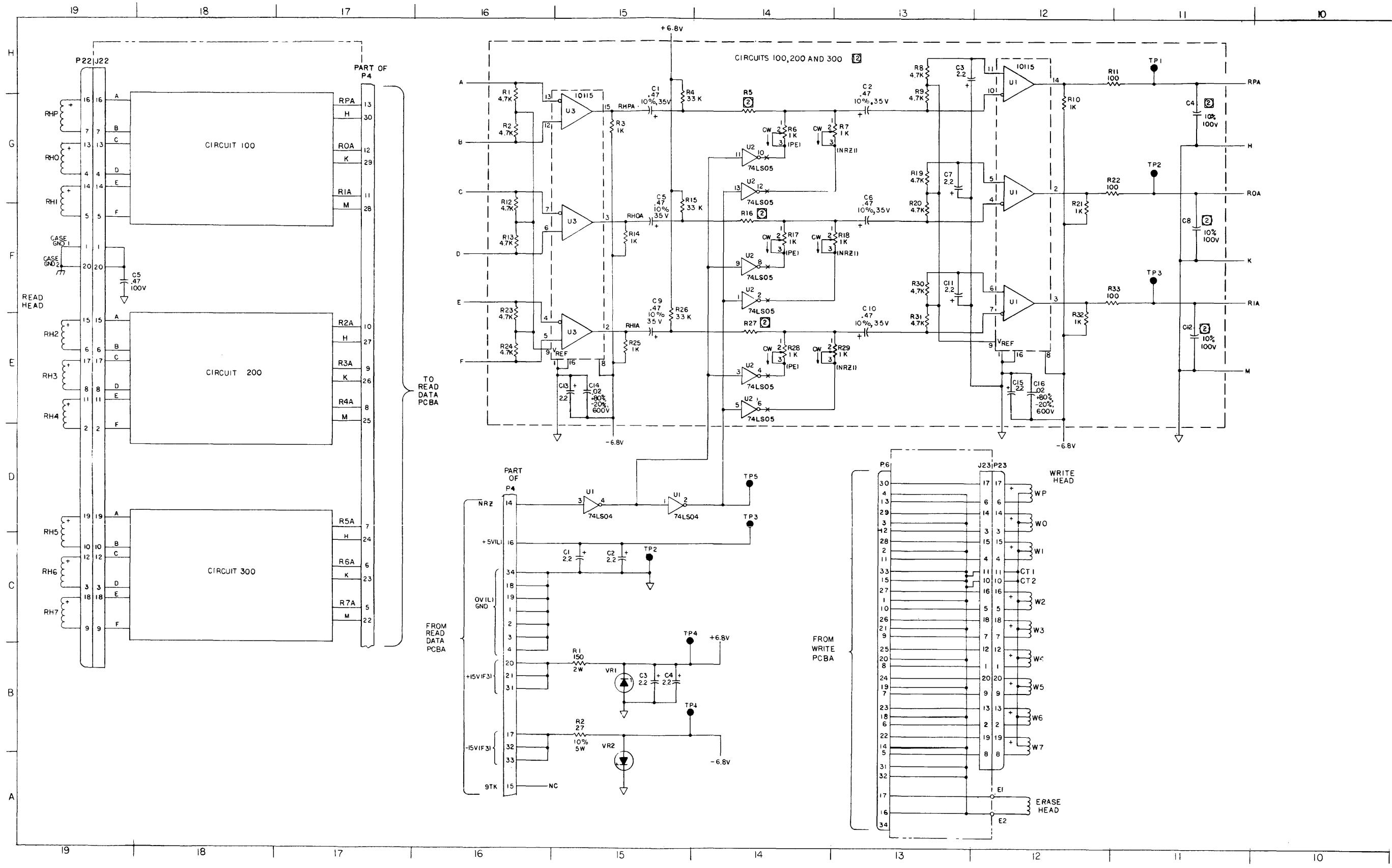


Figure 26 Schematic, 9 TK Preamp (Sheet 1 of 2)

9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

TABLE I

PART NO.	REFERENCE DESIGNATOR
100-1015	R111, 122, 133, 211, 222, 233, 311, 322, 333,
100-1025	R11B, 110, 114, 121, 125, 132, 208, 210, 214, 221, 225, 232, R30, 310, 314, 321, 325, 332
100-3335	R104, 115, 126, 204, 215, 226, 304, 315, 326
100-4725	R101, 102, 106, 109, 112, 113, 119, 120, 129, 124, 130, 131, R201, 202, 208, 209, 212, 213, 219, 220, 223, 224, 230, 231, R301, 302, 308, 309, 312, 313, 319, 320, 323, 324, 330, 331
103-1515	R1
109-2715	R2
123-1020	R106, 107, 117, 118, 128, 129, 206, 207, 217, 218, 228, 229, R306, 307, 317, 318, 328, 329
135-2802	C114, 116, 214, 216, 314, 316
135-3352	C5
139-2244	C1, 2, 3, 4, 108, 109, 111, 113, 115, 205, 207, 211, 213, 215, 303, 301, 311, 313, 315
139-4735	C101, 102, 105, 106, 109, 110, 201, 202, 205, 206, 209, 210, 301, 302, 305, 306, 309, 310
330-0645	VR1, 2
700-0115	U101, 102, 201, 203, 301, 303
710-7405	U102, 202, 302
710-7404	U1

TABLE II

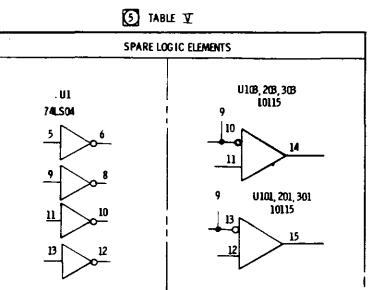
ASSEMBLY 104816	VERSION CHARACTER- ISTIC	C104, 108, 112, C206, 208, 212, C304, 308, 312		R105 116 127, 205, 216, 227 R305 316 327	
SPEED	VALUE	PART NO.	VALUE	PART NO.	
-01	75 IPS	.0068	131-4820	220	100-2215
-02	100 IPS	.0047	131-4720	560	100-5615
-03	112.5/25 IPS	.003	131-3320	560	100-5615

REVISED					
A	ECN B-16 PREPROD RELEASE	1/17/81	104816	PERTEC	H
B	ECN 9832	1/17/81	104816	PERTEC	G
C	ECAD 10178	1/17/81	104816	PERTEC	F
D	ECN 10387	1/17/81	104816	PERTEC	E
E	ECN 10936	1/17/81	104816	PERTEC	D
F	ECN 10930	1/17/81	104816	PERTEC	C
G	ECN 11209	1/17/81	104816	PERTEC	B
H	ECN C12190	1/17/81	104816	PERTEC	A
I	ECN C13113A	1/17/81	104816	PERTEC	

TABLE IV

REFERENCE DESIGNATIONS		
LAST USED	DELETED	
C5	131	132
E2	---	
J4	---	
P4	---	
R2	R33	
TP5	TP3	
U1	U3	
VR2	---	
W1	---	W1

GROUND AND VOLTAGE PIN NO.		
I.C. TYPE	+5V	GND
74LS05	14	7
74S04	14	7



(2) PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH CIRCUIT NUMBER.
(R1 IN CIRCUIT 200 IS R20).

11. (RESERVED)

10. DIODES ARE IN4736.

9. (RESERVED)

8. (RESERVED)

7. CAPACITOR VALUES ARE IN MICROFARADS + 20%, 20V.

6. RESISTOR VALUES ARE IN OHMS, 5%, 1/4W.

5. FOR SPARE LOGIC ELEMENTS, SEE TABLE IV.

4. FOR I.C. GENERIC TYPE NO. AND GROUND/VOLTAGE PIN NOS. SEE TABLE IV.

3. POTENTIOMETERS ARE ±10%, 1/2W.

2. FOR VALUE, PART NUMBER AND USAGE OF COMPONENTS AFFECTED BY VERSION NUMBER, SEE TABLE II.

1. FOR PART NUMBER OF COMPONENTS NOT AFFECTED BY VERSION NUMBER, SEE TABLE I.

NOTES. UNLESS OTHERWISE SPECIFIED

SPECIFICATION 104816

ASSEMBLY 104816

REFERENCE DRAWINGS:

04816 T1000	APPLICATON	SIGNATURES	DATE
PRINTED	1/17/81	PERTEC	PERIPHERAL EQUIPMENT DIVISION
REVISIONS	1/17/81	104816	TITLE
04816 T1000	1/17/81	SCHEMATIC	9TK PREAMP
PRINTED	1/17/81	104816	104816
04816 T1000	1/17/81	104816	104816
PRINTED	1/17/81	104816	104816

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Figure 26 Schematic, 9 TK Preamp (Sheet 2 of 2)

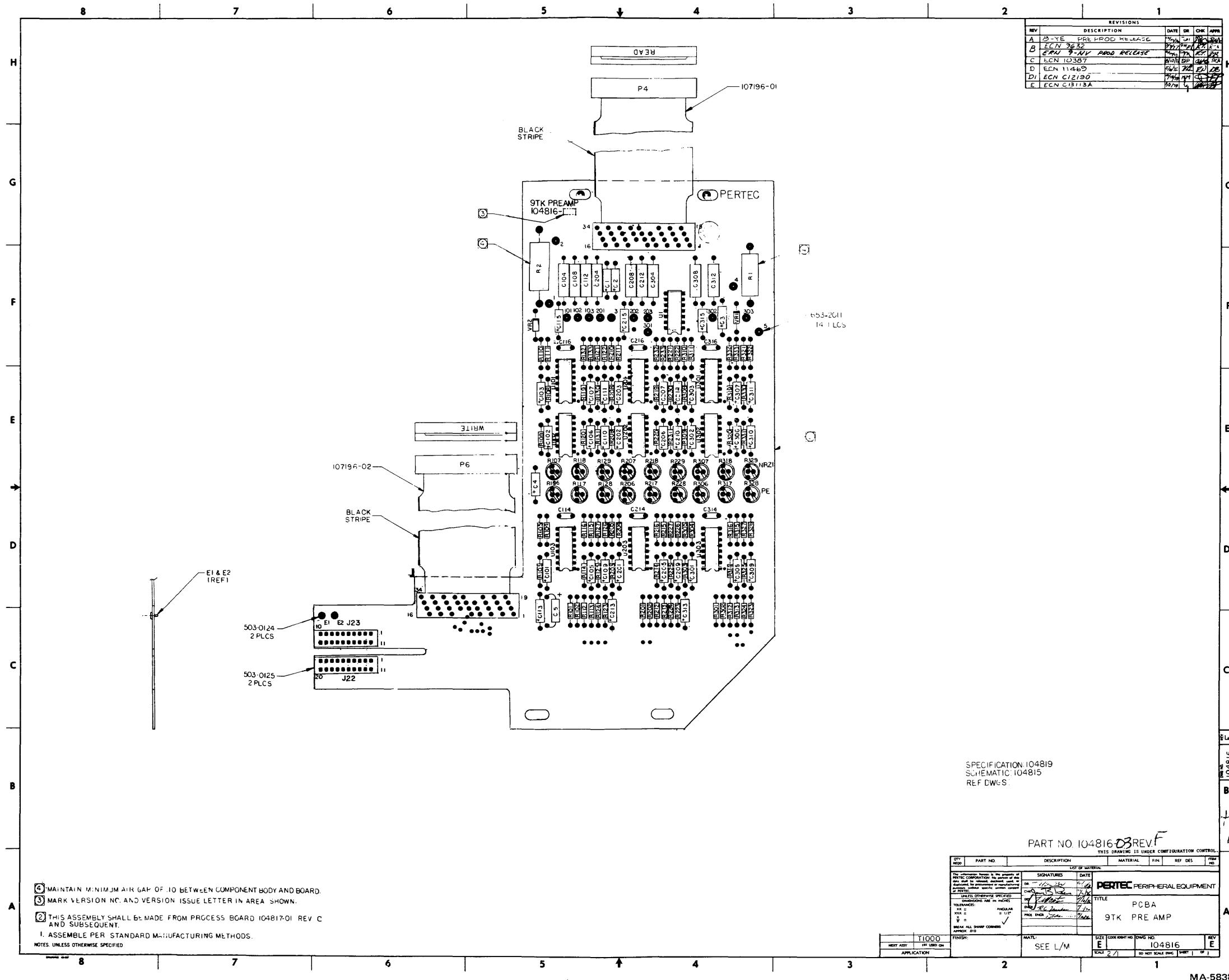


Figure 27 PCBA, 9 TK Preamp